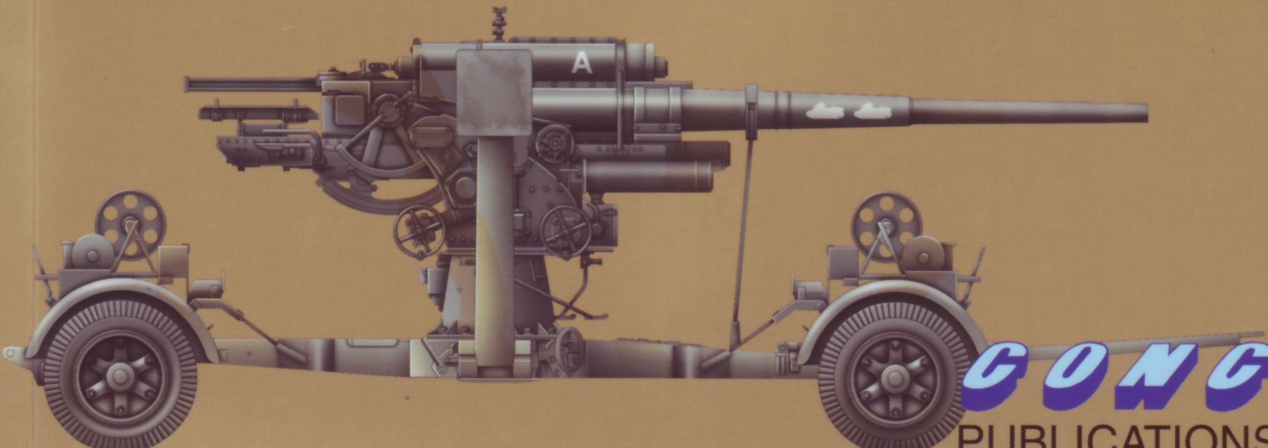
ARMOR AT WAR SERIES

7063

German Artillery at War

1939-45 Vol.2

Frank V. De Sisto



CONCORD
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German Artillery at War 1939-45 Vol.2

Text by Frank V. De Sisto
Color plates by Laurent Lecocq

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Introduction

The introduction contained in the previous volume in this series described the types of ordnance normally seen deployed as part of a division. In the case of German-manufactured artillery, the largest gun that was generally fielded as an "organic" part of these divisions was the 15cm sFH18. With a range limited to 13,325 meters and a projectile that weighed 43.5 kg, this piece would need to be supplemented by heavier artillery.

As a result, Germany fielded a number of different pieces of heavier ordnance, organized at levels higher than that of a division. As a result, Artillerie-Divisionen, Artillerie-Brigaden and Artillerie-Korps were deployed. These types of units would normally be controlled by Korps- or Armee-level headquarters, so that they could be concentrated where needed in order to support the activities of the various units within these larger organizations.

Early in the war, Germany also appreciated the value that "area" or "saturation" fire would have on the modern battlefield. As a result, the Heer (Army) and the Waffen-SS fielded the so-called "Werfer-Brigaden". These units fielded purpose-designed, trailer- or carriage-mounted multiple-tube rocket launchers. While for the most part these simple designs ranged from 15cm through 32cm in caliber, and had limited range and payloads, it should be noted that the much more powerful and longer-ranged A-4 (V2) ballistic missile was operated by units similarly conceived.

NON-DIVISIONAL ROCKET ARTILLERY

15cm Nebelwerfer 41

The smallest caliber rocket was fired from the 15cm NbW41 (smoke thrower, or projector). This consisted of six tubes mounted on a split-trail carriage derived from that of the 3.7cm PaK35/36 anti-tank gun; in a loaded condition it weighed 770kg. To fire, the trails were spread and a stabilizing pad was lowered at the weapon's front end, which raised the tires off of the earth; the rockets were fired electrically via a cable, from a remote location. The rockets weighed 35.5kg each and had a range of 6,900-meters. A single six-unit battery could fire 36 rockets in one 90-second "ripple" salvo.

21cm Nebelwerfer 42

This piece was very similar in configuration and operation to the previously-described 15cm NbW41. Weighing 1,100kg fully-loaded, the 21cm NbW42 mounted five tubes, each firing a 21cm rocket that weighed 47.5kg out to a range of approximately 7,850-meters.

30cm Nebelwerfer 42

This unit comprised of an open frame-work that contained two banks of three launchers, one atop the other. It was mounted on a trailer of a similar configuration to that upon which the 3.7cm FlaK37 was transported. The rockets weighed up to 127kg depending on type, and were identical to those that were mounted on the Wurfrahmen (frame launchers) seen on the Sd.Kfz.251 half-tracks as well as other types of vehicles; a simple ground-emplaced multi-bank launch frame also existed. The loaded 30cm NbW42 weighed 1,860kg and could fire its rockets out to a range of 4,550-meters.

NON-DIVISIONAL HEAVY ARTILLERY

Heavy pieces included the 15cm K18, 17cm K18, 21cm Mrs18 and 21cm K38. Uniquely, these guns (except for the 15cm piece) featured a dual recoil system wherein the gun recoiled on its cradle, which in turn recoiled further on rails that were mounted on the carriage. These guns were so large and heavy that they were broken down into two loads and towed by separate prime movers, usually the 12-ton Sd.Kfz.8. These long-range pieces (from 16,700 meters for the Mrs18, up to 33,900 meters for the K38) were corps- and army-level assets, which were not organic to divisions.

15cm Kanone 18

This piece was originally intended to become the standard heavy gun in a German division, and weighed 12,760kg. The 15cm K18 was hauled in two loads and featured a two-piece carriage design that allowed the emplaced gun to be rotated 360-degrees. The gun fired a projectile weighing 43kg out to a range of 24,500-meters, which surpassed the majority of its contemporaries.

17cm Kanone 18

This large, complex, yet relatively widely-used long-range gun was mounted on the same dual-recoil system carriage as the 21cm K38 and 21cm Mrs18. Intended for deep interdiction and counter-battery fire out to a range of 29,600-meters with a projectile that weighed 62.8kg, the 17cm K18 weighed 17,520kg when emplaced.

21cm Kanone 38

The most powerful field artillery piece made in Germany, the 21cm K18 could fire a projectile weighing 120kg to a range of 33,900-meters. Towed in two parts, when emplaced, the gun weighed 25,300kg. An excellent design that was based on experience with contemporary 17cm and 21cm pieces, only a hand-full of these refined guns were produced by 1943; service was therefore limited.

21cm Mörser 18

Although designated as a "Mörser" (mortar) this piece could fire at a wide variety of angles and behaved more like a "gun-howitzer". The 21cm Mrs18 could fire an extensive suite of ammunition including concrete-piercing rounds, fin-stabilized rounds and "stick-bombs". The maximum range of the 121kg HE shell was 16,700-meters. The carriage was broken down into two loads for vehicle towing and weighed 16,700kg emplaced. There were two different wheel bogie units fitted to this piece. One was the typical two-wheeled cast-steel type with rubber rim; the other a four-wheeled pneumatic tire unit.

NON-DIVISIONAL HEAVY ANTI-TANK ARTILLERY

Heavier guns, such as the 8.8cm PaK43 and the hybrid 8.8cm PaK43/41 were normally part of separate schwere Panzerjäger-Abteilungen (heavy tank-hunter battalions) and not organic to divisions. These guns were heavy and unwieldy, but could devastate any enemy tank encountered on the battlefield, many at long range. The 8.8cm PaK also fired a useful high-explosive round, and therefore could supplement field artillery. Both Krupp and Rheinmetall designed and built prototypes of super-heavy dual-purpose field/anti-tank guns, the 12.8cm K44 (built by the former) and 12.8cm PaK44 (built by the latter). Heavy and complex, it is possible that some prototypes saw service.

8.8cm PaK43 L/71

Designed specifically to kill enemy tanks, this gun could penetrate 226mm of armor, angled at 30-degrees, at 500-meters. Seeing service from 1943, the gun weighed 5,000kg in traveling order. With a height of less than five feet when emplaced, the piece was mounted on a cruciform platform to which the separate front and rear bogies would be attached for travel. In a hasty engagement, the gun could be fired while in travel mode. As designed, this piece had an angled shield to protect the crew from shell splinters.

8.8cm PaK43/41 L/71

A true improvisation, this anti-tank gun placed a PaK43 gun tube on the mount and carriage of the 10.5cm l.FH18, finished off with wheels from the 15cm s.FH18. Frequent production disruptions resulting from Allied air raids combined with a high demand and "off-the-shelf" components, helped create this hybrid variant. This piece had the same armor penetration specifications (226mm at 30-degrees, at 500-meters), but weighing in at 4,380 kg, it was lighter than the standard 8.8cm PaK43

NON-DIVISIONAL HEAVY ANTI-AIRCRAFT ARTILLERY

Heavier pieces, such as the 10.5cm FlaK38/39, and 12.8cm FlaK40 (as well as the Flakzwilling 40 twin-mount) were far less mobile and were rarely seen at the front. They played a significant role in defending the Reich, being deployed on mobile railroad flatcar mounts (typically the 10.5cm piece), or in huge concrete "Flak Towers" (the 12.8cm single and twin pieces). There were 2,018 10.5cm FlaK38/39s in service by mid-1944; 116 were on railroad car mounts, 1025 were mobile, and the remainder on static mounts. The first eight Flakzwilling 40s were deployed in 1942, but since the production was slow (sources state only one per month) there were only 34 in service by early 1945.

10.5cm FlaK38/39 L/63

Although designed to be as mobile as the much more common 8.8cm FlaK (using a Sd.Ah.202 bogie system), this anti-aircraft gun's relatively high weight (14,600kg) precluded large-scale deployment by field units. By mid-1944 about half of the guns still in service were static or railroad-mobile. It could fire its 15.1kg shell to a ceiling of 12,800-meters; the improved FlaK39 had the later UTG37 fire control data transmission system as designed for use with the 8.8cm FlaK37.

12.8cm FlaK40 L/61

Originally also designed to be somewhat road-mobile, with a weight of 27,000kg this proved to be impractical. Six of these guns were built as mobile pieces, with all remaining production geared to static-mounts, which weighed 13,000kg when emplaced. A skilled ten-man crew could pump out up to 12 rounds-per-minute and engage targets at an altitude of 14,800-meters, which meant the 26kg projectile could reach any Allied heavy bomber in the sky. An improved version, the FlaK45, was in development at war's end.

12.8cm Flakzwilling 40

The ultimate in conventional anti-aircraft artillery, this twin gun was typically mounted in groups of four, on massive, high "Flak Towers", which themselves doubled as civil air-raid shelters. Always emplaced to cover high-value targets such as Berlin, Vienna and Hamburg, these guns had performance identical to the single 12.8cm FlaK, except that their rate of fire could be as high as 24 rounds-per-minute. The mount had a crew of 21 men and one commander; there were two loaders, and seven ammunition handlers for each tube, while the remainder of the crew trained and fired the piece. In place, these guns weighed 28,000 kg.

In development at war's end, were prototypes of a 15cm FlaK50, 15cm FlaK60F and 15cm FlaK65. These would feature fully-powered mounts and automatic loading systems. The FlaK50 had no great advantage over the 12.8cm FlaK40 and so was never put into production. The Krupp FlaK60F and Rheinmetall FlaK65 were improvements as well, but also never reached the deployment stage.

MISCELLANEOUS TYPES

Tapered-bore PaK

As time went by, various other anti-tank weapons came into being, notably the limited-use Gerlach tapered-bore (or "squeeze-bore") guns. While these packed more penetrating power into a smaller (and therefore lighter, more easily transported) piece, they were more expensive to produce than conventional guns. What ultimately proved to be their undoing was the lack of adequate supplies of tungsten, which was the key to their projectile's ability to penetrate armor plate. These types of guns included the relatively widely-used 2.8cm s.PzB41, as well as the less well-known 4.2cm PaK41 and 7.5cm PaK41.

Recoilless guns

Several different types of recoilless pieces of ordnance were developed and fielded by Germany during WW2. The lightest was the 7.5cm Leichtgeschütz 40, which weighed 145kg and fired a shell that weighed 5.83kg to a range of 6,800 meters. It was followed in service by a scaled-up version, the 10.5cm Leichtgeschütz 40. The larger-caliber piece weighed 388kg and could fire a 14.8kg projectile to a distance of 7,950 meters. Both were Krupp designs that could be disassembled into several loads for dropping by parachute for use by airborne troops, or for mule transport for use by mountain troops. The final piece to see service was the Rheinmetall-designed10.5cm LG42. Using less exotic metals in its construction, this gun weighed 552kg and had the same performance as the 10.5cm LG40; a simplified version was mounted on a heavy tripod.

Experimental guns

No designers are ever content to rest on their laurels, therefore the German armaments industry was always at work on some new engine of war. Although some of these designs actually saw limited action, for the most part they remained as prototypes. For example, several different "Salvenmaschinenkanonen" (automatic salvo cannon) were in development apparently prior to the war's beginning. Usually consisting of eight parallel gun tubes (typically of 2cm caliber), these had a single breech that fired all weapons simultaneously.

Very long-range artillery pieces were usually mounted on railroad carriages. These huge guns were expensive, man-power intensive to operate and usually too easy to target, especially by enemy air power. An unusual gun, which saw service during the Ardennes fighting in late 1944 with Heeres-Artillerie-Abteilung 705, was the "Hochdruckpumpe" (HDP, or High-Pressure Pump; a code name), or V-3. Fired operationally for the first time on December 30, 1944, this piece of ordnance consisted of a smooth-bore gun tube that could be up to 123 meters long; it fired a 16cm projectile, which weighed 90kg. The tube was positioned on a hill-side to gain elevation. Long range was achieved by the unique method of having additional firing charges in breeches, spaced at intervals along the gun tube; as the projectile passed, the charges would fire, adding velocity. The theoretical range of 160km was never achieved, with the operational gun achieving a range of about 60km.

Experimental rockets and missiles

Towards the end of the war, several medium-range tactical rockets were in development, including the multi-stage "Rheinbote", or V-4. This had a range of up to 230km and could deliver a warhead weighing approximately 40kg. Firing in support of the Ardennes offensive, Heeres-Artillerie-Abteilung 709 fired over 40 of these un-guided surface-to-surface missiles beginning on Christmas Day 1944, through mid-January 1945.

The cruciform mount for the 8.8cm FlaK36s and FlaK41s were used as launch platforms for various rocket and missile artillery. The modified FlaK36 unit could fire the “Enzien”’ a winged, radio-controlled high-altitude anti-aircraft missile. Looking like a scaled-down Me-163 rocket fighter, this system never reached operational status. The “Rheintocter” (Rhine Daughter) was another failed attempt to field an anti-aircraft missile; this was launched from the FlaK41 carriage. Skoda designed a 10.5cm un-guided anti-aircraft rocket, which was fired from a FlaK36 cruciform mount. 16 of these 19kg rockets could be ripple-fired from the launcher. A smaller version, which saw operational service, notably at the Rhine River Bridge at Remagen was the Flakwerfer 44, or “Förngeräte” (Storm Weapon). This piece fired un-guided 7.3cm anti-aircraft rockets from 35 launch rails, arranged in a box-shape containing five columns of seven launch rails.

Captured guns

Before the actual beginning of the Second World War, Germany scored a notable coup when the rest of Europe passively allowed the dismemberment of Czechoslovakia. Hitler’s mad gamble paid off in several ways. Germany did not have to fight the well-equipped Czech armed forces; much territory was ceded to the Reich, and the robust and modern Czech arms industry fell, intact, into the hands of the Nazi warlord. This led to the acquisition of the Skoda LT.vz.35 and Praga LT.vz.38 light tanks, as well as several modern gun designs. The most notable gun was the Skoda 47mm kanon P.U.V. vz.36 L/43.4, which was fielded in towed and self-propelled mounts. Designated 4.7cm PaK36(t) by the Germans, it had superior performance when compared to the German 3.7cm PaK35/36 L/45; it could penetrate 51mm of armor, angled at 30-degrees, out to 700 meters compared to the German guns specs of 38mm at 400 meters.

The fall of Poland in 1939 also supplied modest numbers of the excellent Swedish-designed Bofors 37mm armata przeciwpancerna wz.36, or 3.7cm PaK157(d) anti-tank gun, as well as the classic (in this case a Polish license-built) 40mm armata przeciwlotnicza wz.36, or 4cm FlaK28 (Bofors) anti-aircraft gun.

When France fell and the British were forced to retire across the English Channel, vast numbers of vehicles, tanks and pieces of ordnance were captured by Germany. While far more French guns fell into German hands, more British 40mm Bofors anti-aircraft guns were added to those captured in earlier campaigns. A large variety of French guns were used by the Germans; many 75mm gun tubes were mounted on the PaK38 carriage for anti-tank use. The classic 155mm Grand Puissance Filloux (GPF) long-range guns, in their several different guises, were readily taken into service as the 15.5cm K418(f), K419(f) and K424(f).

Vast numbers of Soviet guns were captured during operation Barbarossa. Many were immediately turned against their former owners, while some such as the 76.2mm Field Gun Model 1936, initially designated 7.62cm FK296(r) by the Germans, were re-bored to fire the PaK40 round; these guns were re-designated 7.62cm PaK36(r). The 85mm Anti-aircraft Gun Model 1939 was also re-bored to take German ammunition, and re-designated as the 8.5/8.8cm FlaK M39(r). Other widely-used guns were the 122mm Field Gun Model 1931 and Model 1931/37. These were re-designated by the Germans as 12.2cm K390/1 and K390/2, respectively; many found their way across Europe and served against the Western Allies after the Normandy invasion. The 122mm Field Howitzer and the 152mm Field Howitzer Models 1938, were also used in relatively large numbers by the Germans as the 12.2cm s.FH396(r) and 15.2cm s.FH443(r), respectively. Other notable pieces were the 152mm Gun-Howitzer Model 1910 and 1937, taken into service as the 15.2cm KH 433/2 and 433/1, respectively.

SUPPLYING THE GUNS

During World War Two, in Europe proper, there was an excellent railroad infrastructure. Likewise, the road networks were relatively well-designed and maintained. Excluding air interdiction and the actions of partisans, these systems allowed for the timely delivery of the volume of munitions expended by a modern, mobile army. However, when Germany crossed the Mediterranean to fight in the desert wastes of North Africa, or marched east into the vastness of the Soviet Union, their logistics “tail” quickly broke down.

The air and sea lanes to North Africa were eventually severed by Allied air and sea power; the lack of a modern transportation infrastructure, coupled with vast distances and extreme weather, eventually helped to check German designs in the Soviet Union. One successful expedient method of creating a supply vehicle better able to cope with weather and terrain extremes was the so-called “Maultier” (Mule). This consisted of either a 3-ton or a 4.5-ton truck chassis with its rear wheels replaced by the suspension system of a light AFV or tank. Regardless of whatever measures were taken, there was never enough motorized (or, for that matter, horse-drawn) transport to meet demand.

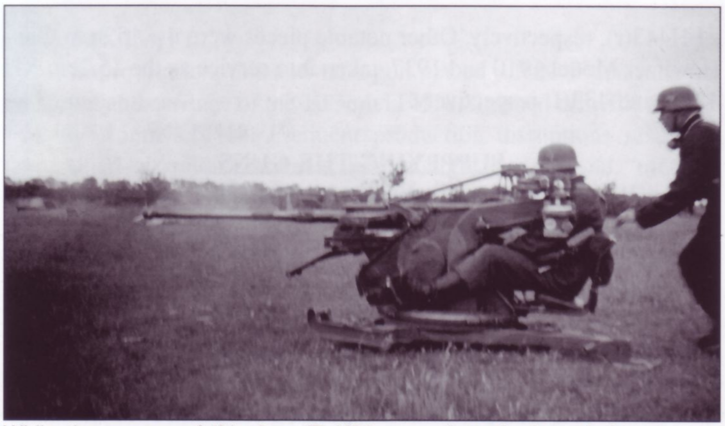
Although the dreaded “eighty-eight” could destroy any tank or aircraft in service, it was a useless curiosity unless it had ammunition to shoot, fuel and spare parts for its tractor, and a healthy, well-fed and properly clothed crew to operate it.

A NOTE ON THE PHOTOS

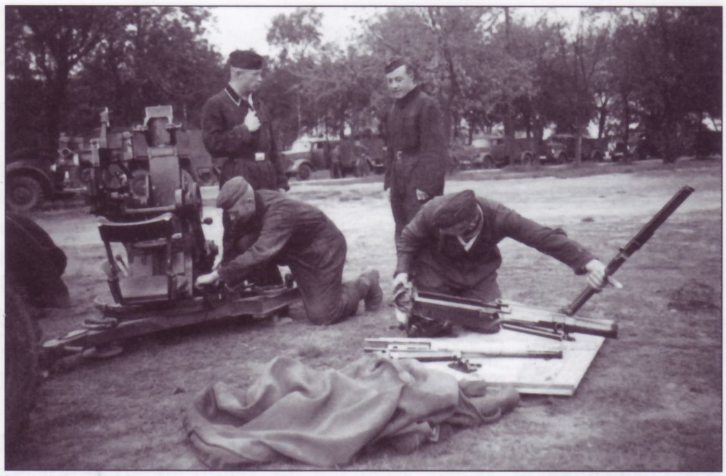
The reader will note that there are several gaps in coverage between these covers. This is not intentional, but is due to the lack of availability of appropriate images. It should also be noted that Concord’s researchers made every effort to redress this imbalance, with images being acquired up to the time these books were completed.

ACKNOWLEDGEMENTS

This collection of photographs includes text and captions that were created by consulting published secondary sources. I obtained information from the work of the following authors and researchers: Marcin Bryja, Peter Chamberlain, Hilary Doyle, Richard Eiermann, Wolfgang Fleischer, Terry Gander, Werner Haupt, Tom Jentz, Werner Muller and John Norris. My sincerest thanks go out to all of these gentlemen for their years of dedication to “the cause”. Again, my team-mate, Laurent Lecocq, has been quite responsive to my requests for the odd tweaks of his color art work. In addition, Laurent worked on both books simultaneously and in several cases created not only perspective drawings, but also profile views that contained both a gun and tractor. These all took far more time and effort than is usual, and for that he has my sincere thanks. Also not to be forgotten is the efforts of the Concord team, headed by Freddie Leung, to un-earth fresh new photographs of the subject at hand. And, thanks must again go to Ralph Zwilling for his help in properly presenting German military/technical terms. Any mistakes in fact or in content are my responsibility alone.

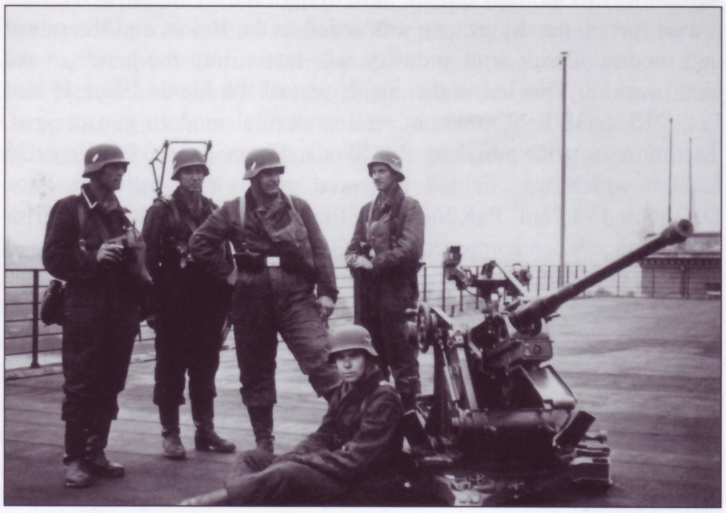


While the gunner of this 2cm FlaK30 peers intently through his sight, a second crewman rushes towards the piece. Judging by the bit of smoke lingering around the gun tube, it would appear that the gun has just been fired, so it is possible the second man is about to change the ammunition magazine. Since there are no other men clustered around the gun as they would normally do during combat, it is probable that this photograph was made during training; note the pre-war "feuersicherem Buntfarbenanstrich" camouflage scheme, painted with hard edges to the colors.

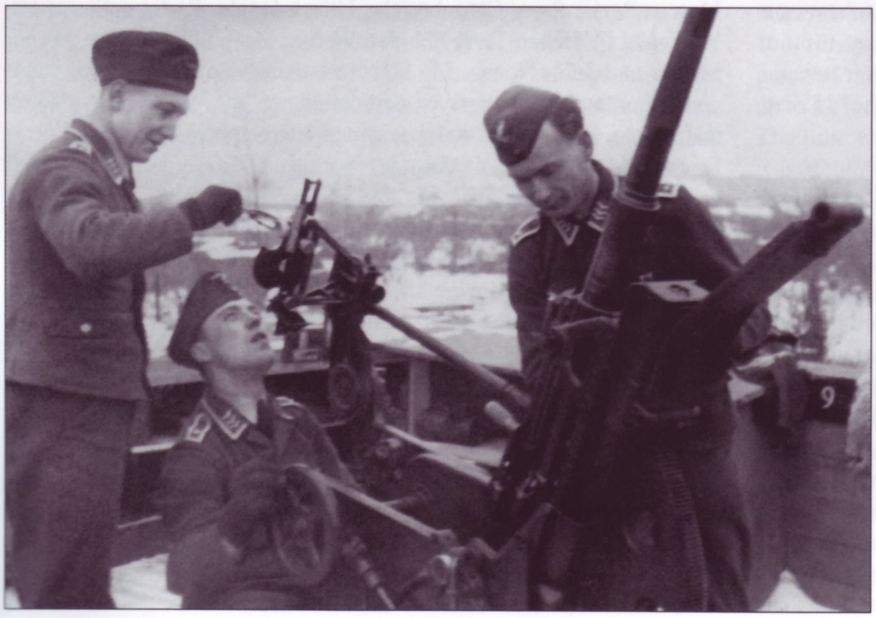


In what is also probably a pre-war training scene, the crew of this 2cm FlaK30 has partially disassembled their gun for maintenance. Note the man at right working on the receiver group, while to the left another crewman works on the platform mount. In the background are several motor vehicles, including a Krupp L2H143 (Kfz.69) tractor at left, and a number of Opel Blitz 3-ton trucks at right.

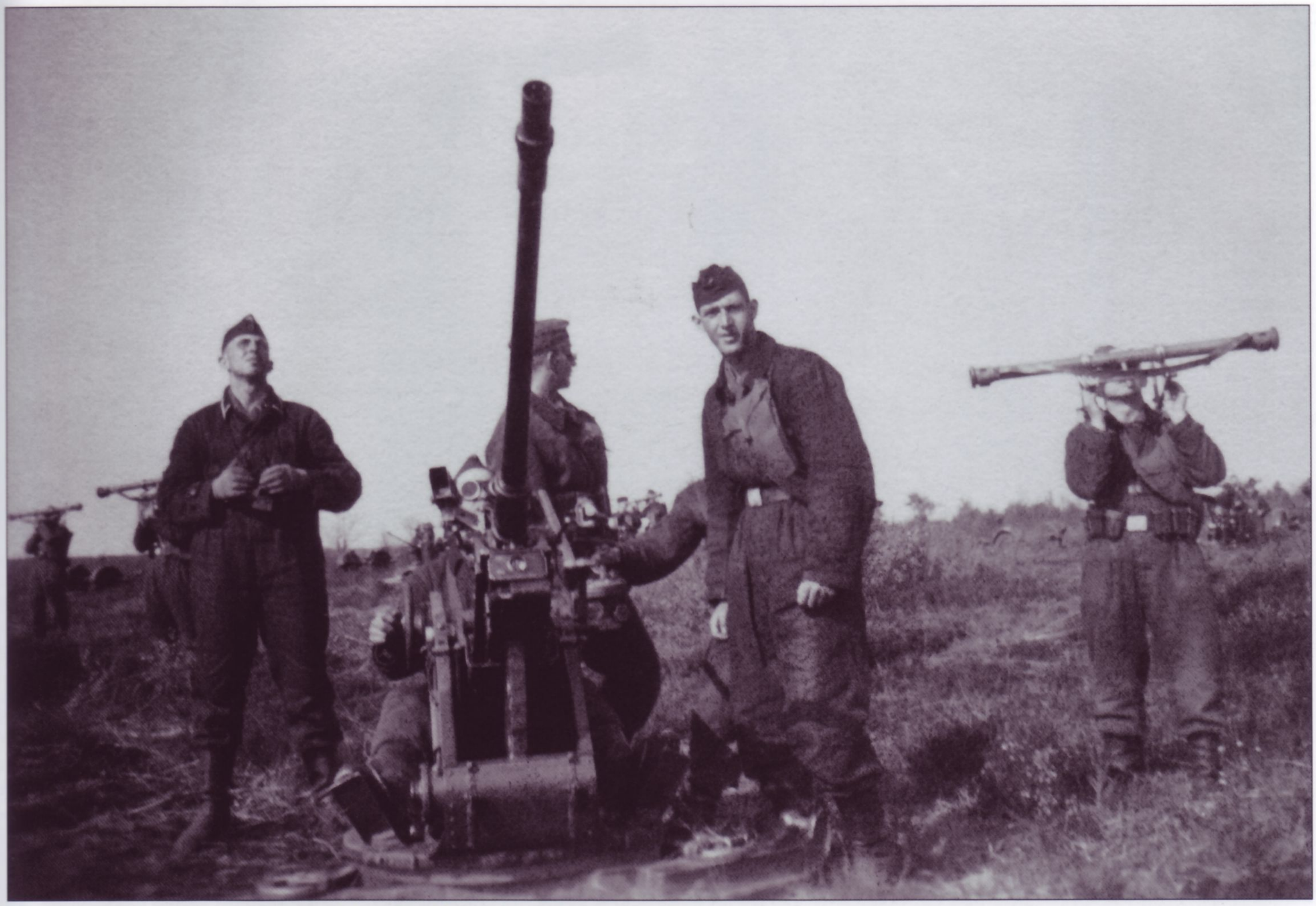
While a group of civilian on-lookers wait in the background, this Luftwaffe (Air Force) crew of a 2cm FlaK30 settles down for a meal. Their gun is being displayed to the civilians in order for them to become acquainted with their newly-formed Luftwaffe; the "feuersicherem Buntfarbenanstrich" camouflage scheme dates the photo as sometime before July 1937, when the color scheme was changed to a two-tone scheme of Dunkelgrau Nr.46 and Dunkelbraun Nr.45.



A Luftwaffe crew of this 2cm FlaK30 stands by their piece, which is mounted on a large platform overlooking a river-side town in the background. The platform appears to have a camouflage pattern painted on its deck, but since it has rails precluding the depression of the gun, it was probably originally a civilian structure. Note that the second man from the left wears the shoulder supports for the hand-held 1-meter R36 rangefinder, which itself is being held by the standing man at far right.

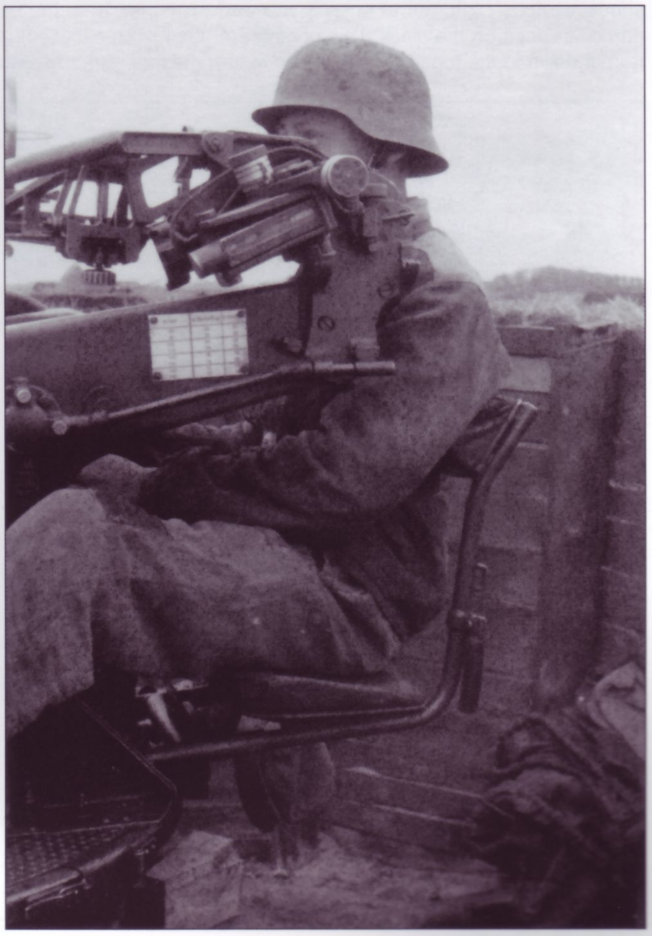


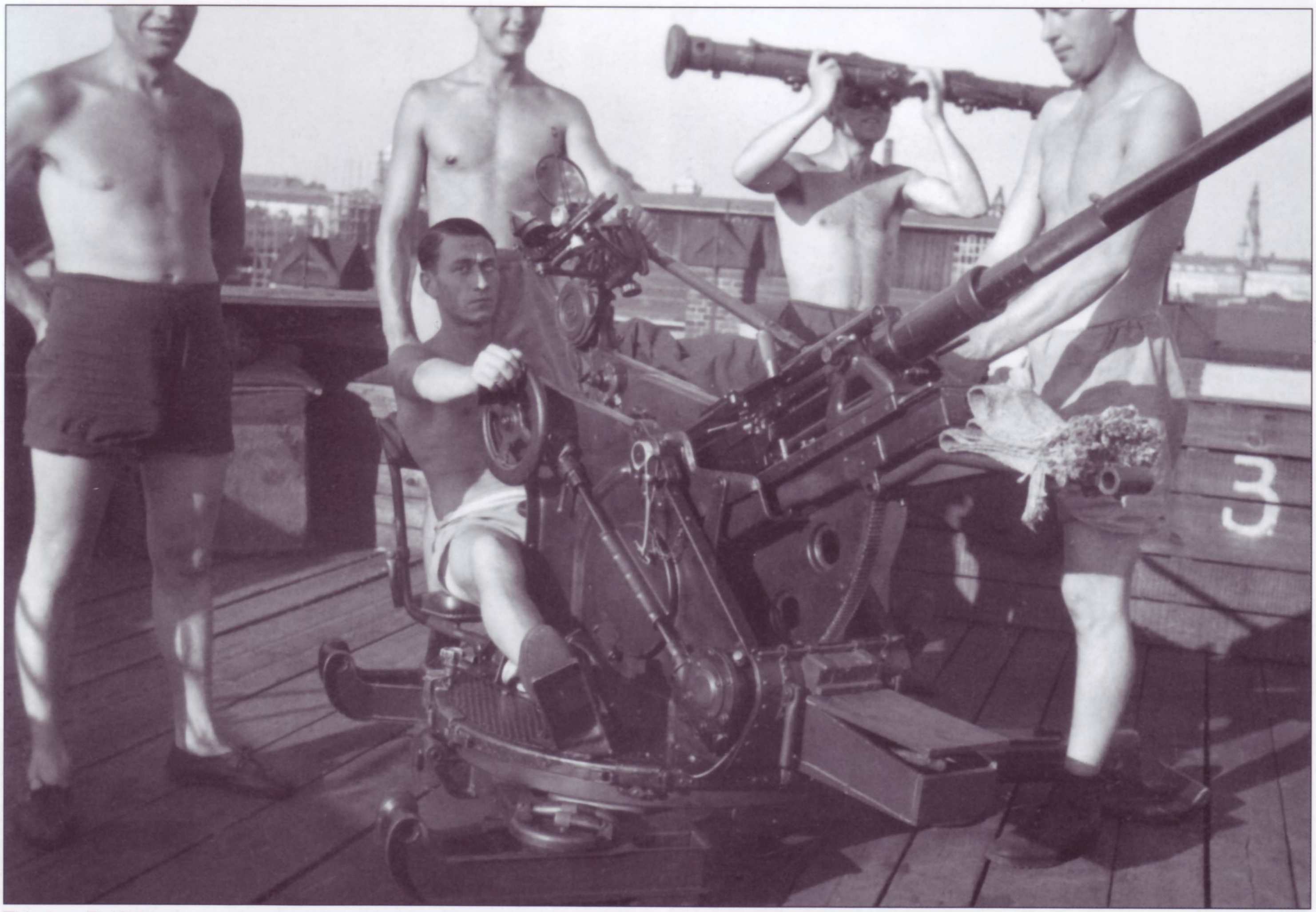
Comparing this photo to the previous one, will show how the gunner's sight has been extended for use. This Luftwaffe 2cm FlaK30 is also emplaced, either on a hill-top or an elevated platform; this was done when feasible in order to provide a clear view and an unobstructed field of fire.



What appears to be an entire battery of 2cm FlaK30s is deployed in an open field. Note the Sd.Ah.51 limbers in the far left background and several men holding 1-meter R36 rangefinders. This Luftwaffe crew wears coveralls and side-caps as well as gas cape pouches slung in front of their chests.

The crew of this 2cm FlaK30 apparently composed of a mixture of veterans and youthful Flakhelfer or Luftwaffenhelfer (air force volunteer auxiliaries), pose for the camera. It is believed that approximately 200,000 teen-age members of the Hitler Jugend (Hitler Youth) were eventually conscripted into the Luftwaffe to help man FlaK installations. The close-up photograph of the gun shows several interesting details, including the Lineavisier 21 sight and linkage (apparently folded in a stowed, or "out-of-service" position), a data plate and the configuration of the gunner's seat. The gun is emplaced in a permanent structure using wood to enclose and preserve the parapet.

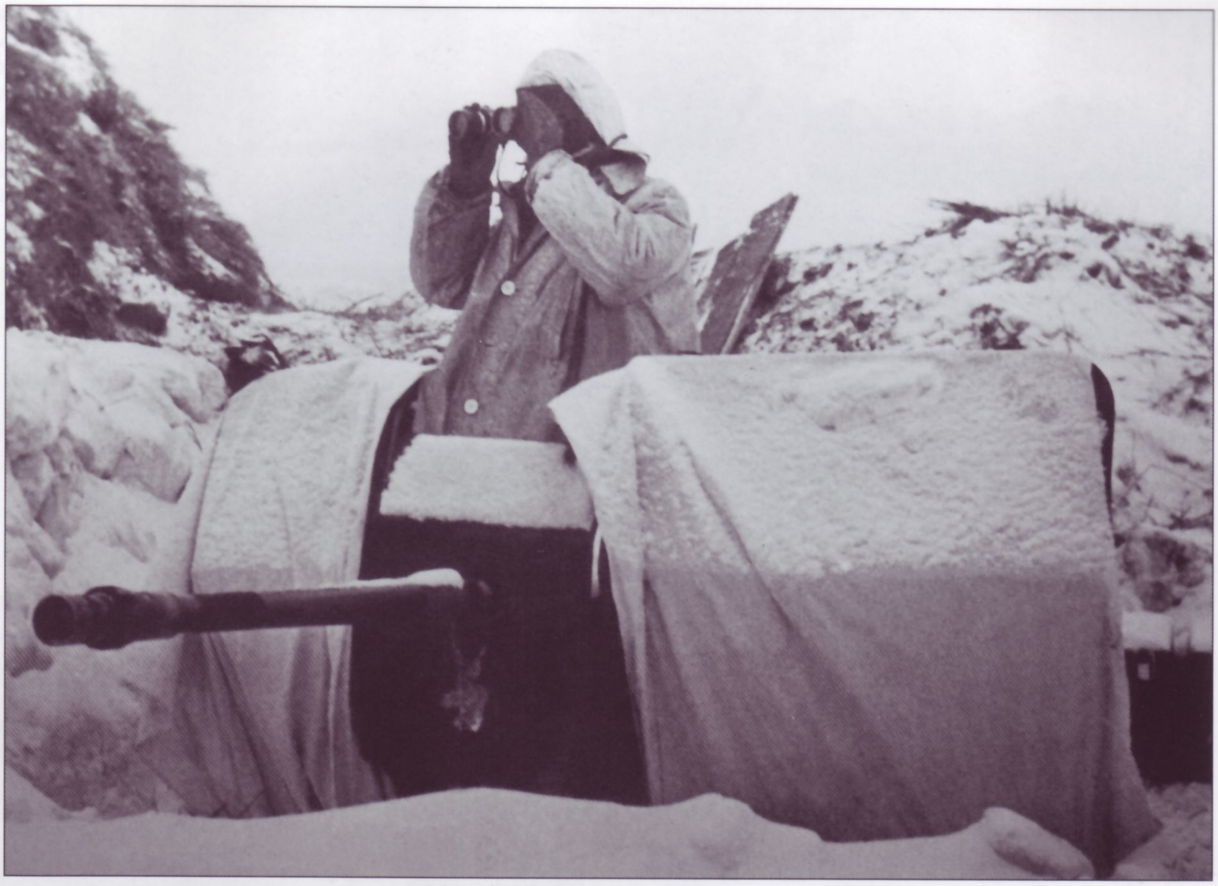




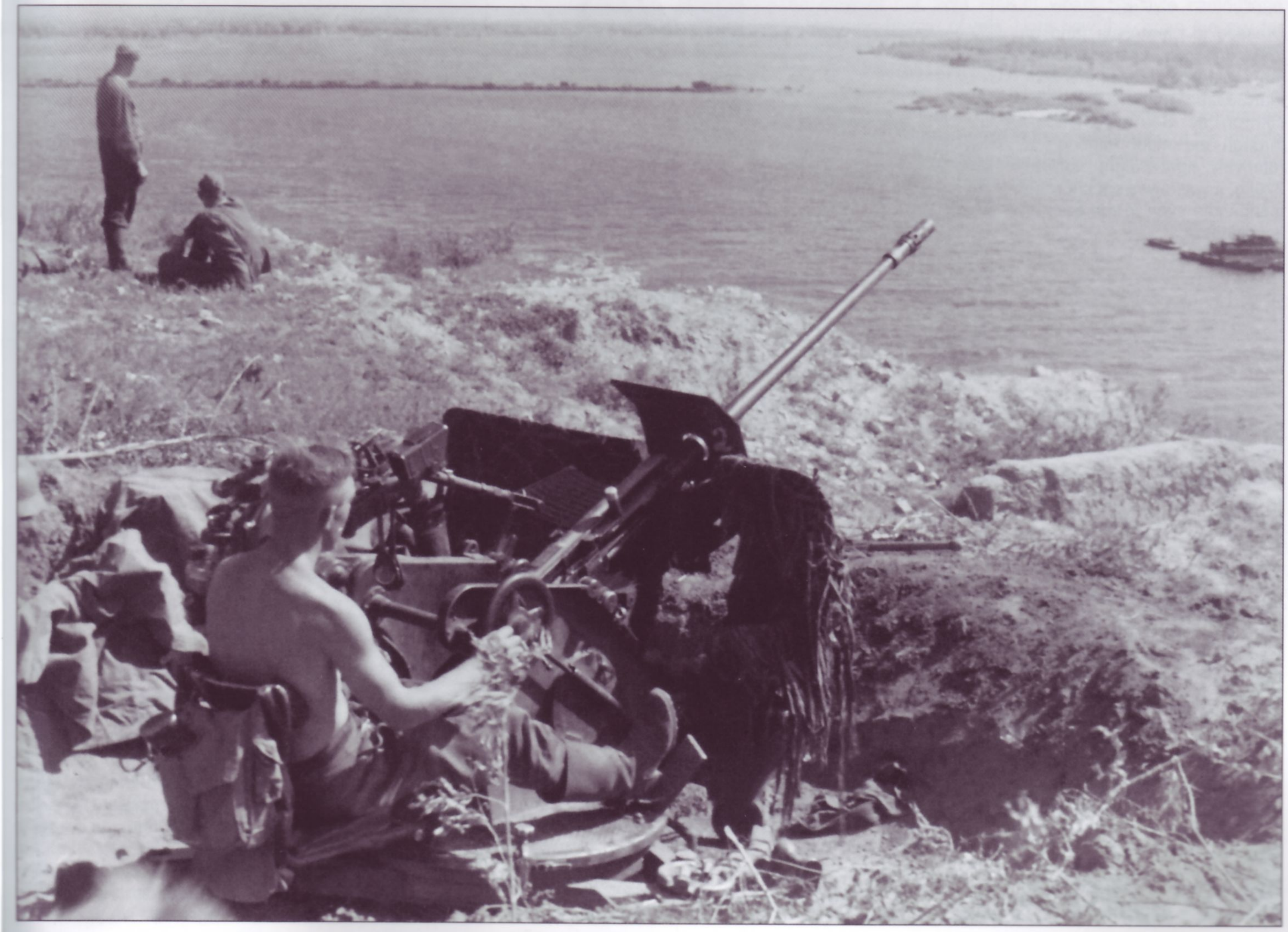
This 2cm FlaK30 is mounted on a roof-top platform, apparently within a factory complex. The five members of the crew are "dressed down" in shorts and low shoes, obviously in order to enjoy some warm weather. Note the number "3" on the wall behind the man at far right, which was used to direct the gun to a particular point on the clock. This photograph affords an excellent view of the gun's details; note the gunner's elevation hand-wheel and the shaft that runs from it down to the toothed gear, which in turn meshes with the elevation gear quadrant below the gun tube.

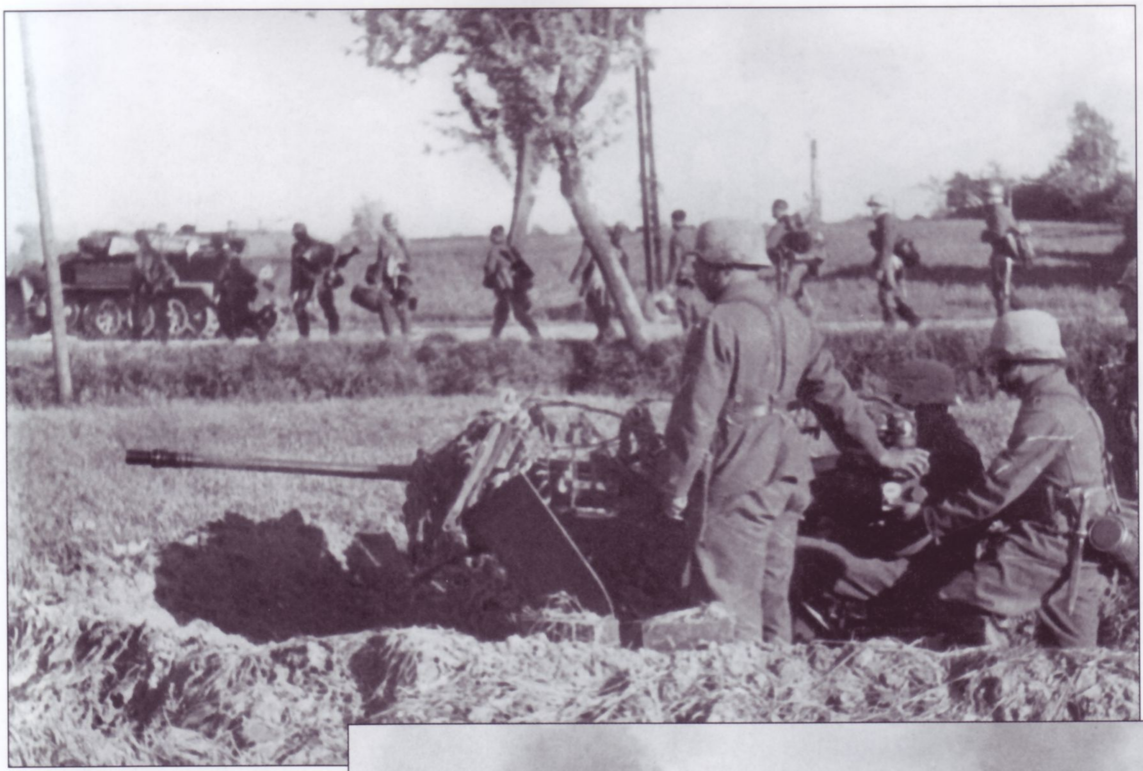
The crew of this 2cm FlaK30 has placed their piece in a ruined structure, while they bring fire to bear against a ground target. Note the high-power binoculars fitted to a tripod, which are probably being used by the officer to spot for the gunner.

In another winter scene, this 2cm FlaK30 has been concealed against a terrain feature using white cloth sheets. Freshly-fallen snow has also provided further concealment to the piece as a crewman using binoculars scans for enemy targets. This view also affords a good look at the configuration of the bore-mounted flash suppressor.

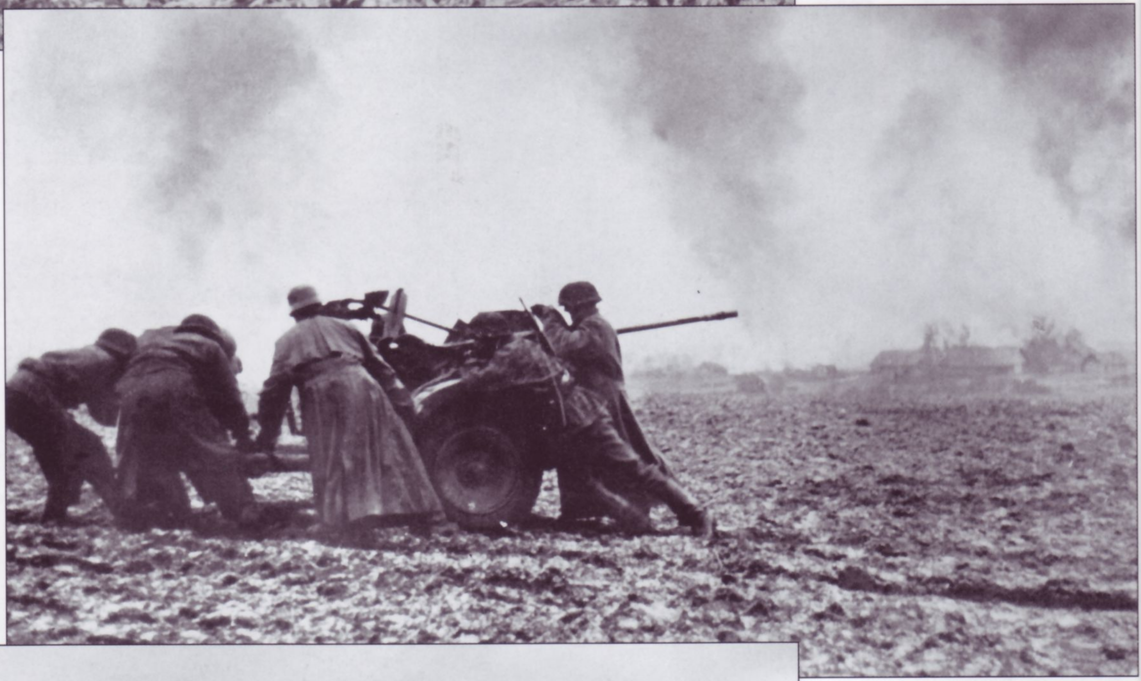


In a rather bucolic setting, the gunner maintains watch with his 2cm FlaK30, overlooking a body of water. Such a position gives an excellent field of fire, allowing the gunner to actually shoot down at low-flying aircraft. This gun is also fitted with shields for protection against small-arms fire and shell splinters.

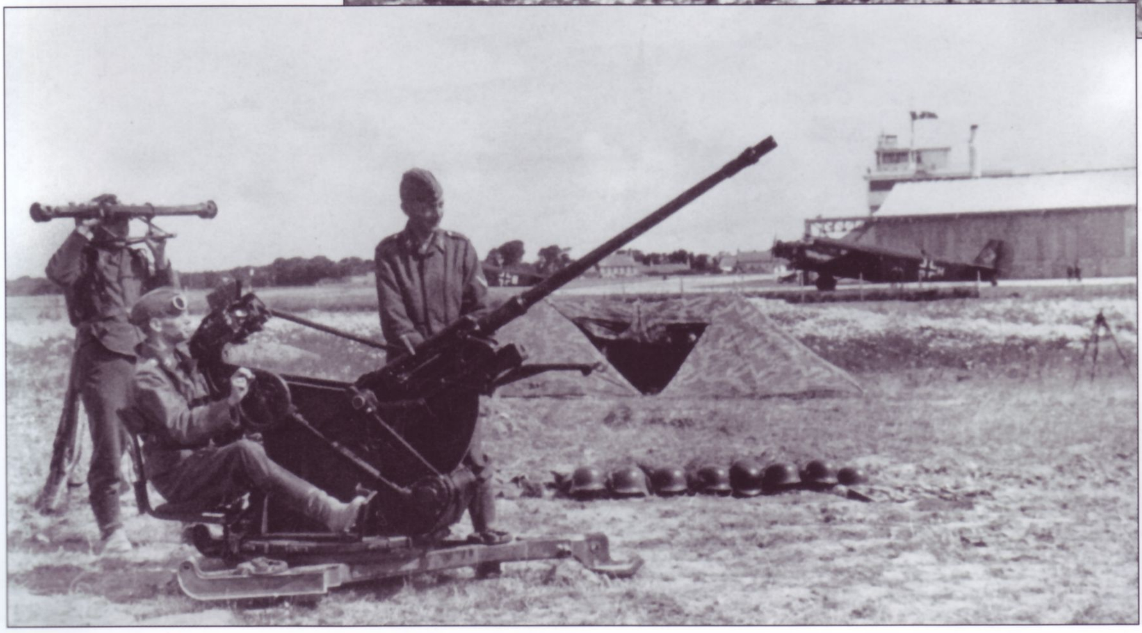




An emplaced 2cm FlaK30 covers a road as infantrymen and an Sd.Kfz.251 Ausf.A or B advances. This gun also has a splinter shield fitted and it seems that the crew have used mud to tone down their helmets for concealment.

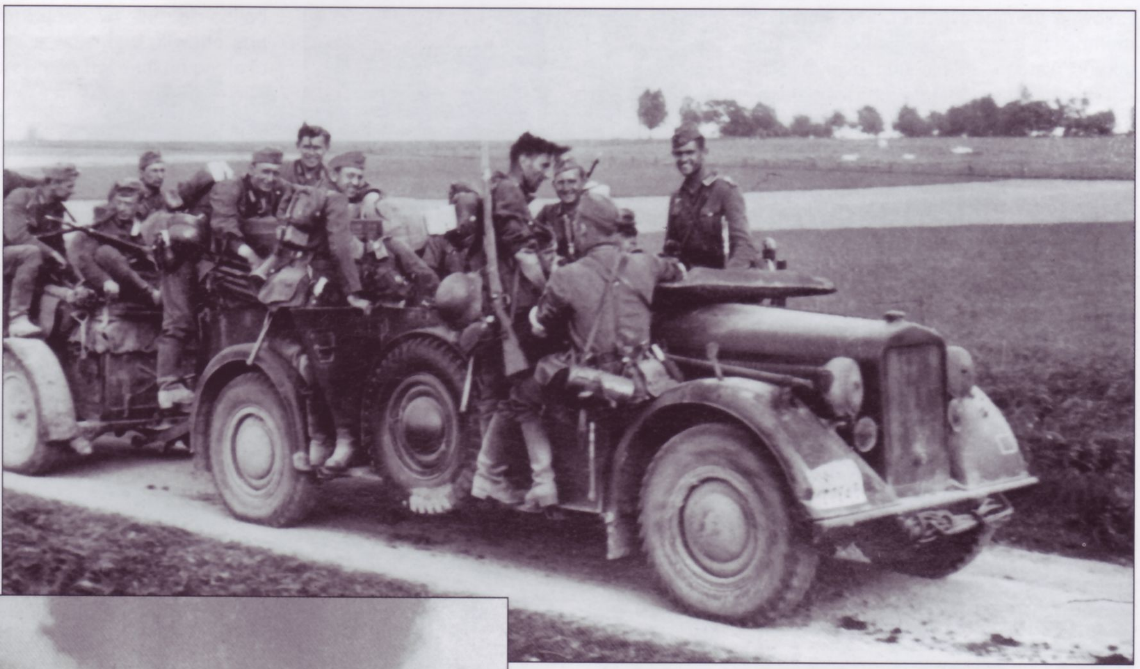


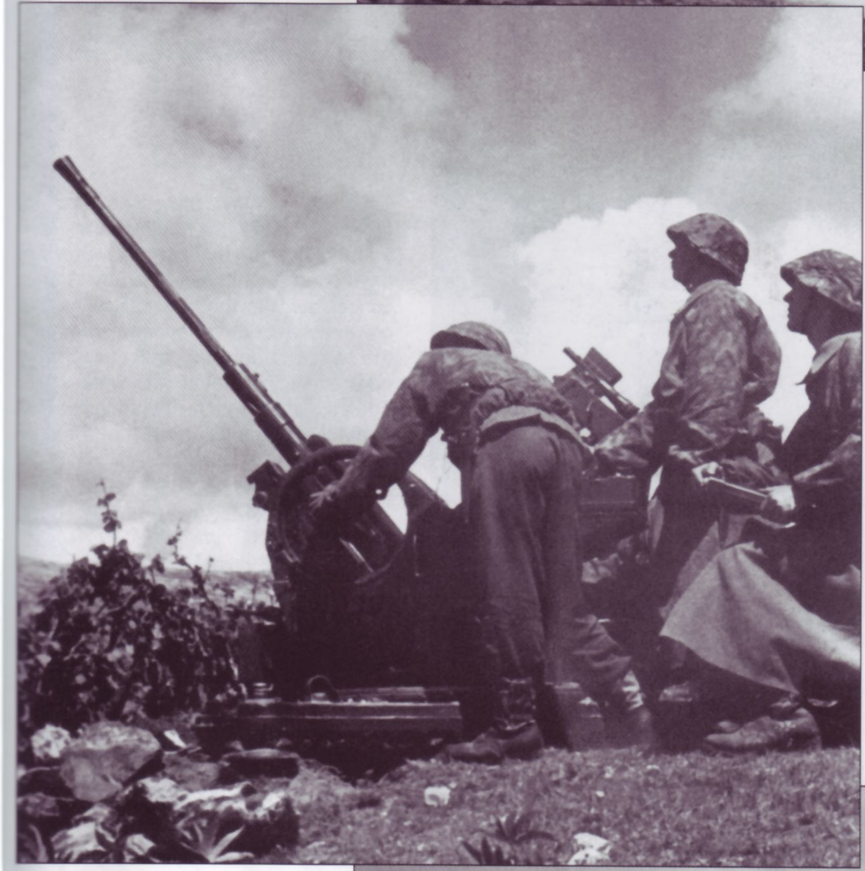
Dressed in greatcoats (and at least one camouflage smock), the Waffen-SS crew of this 2cm FlaK30 labor to move their gun, still on its Sd.Ah.51 limber, through the mud. Although a relatively light-weight gun at 770kg, it was always a chore to manhandle even in the best of conditions.



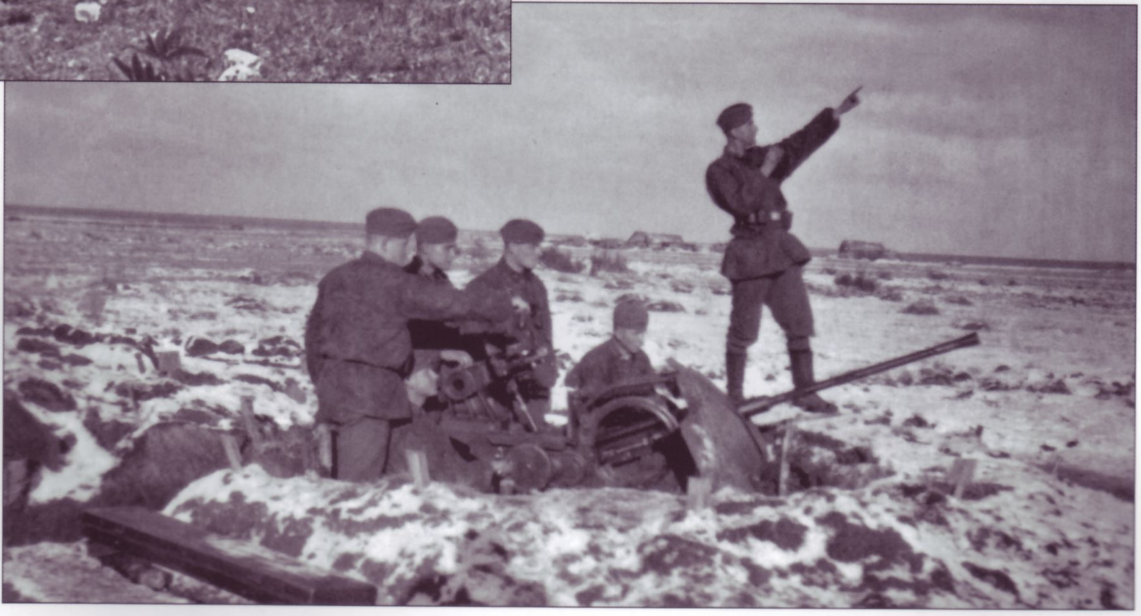
A Luftwaffe 2cm FlaK30 sits on an airfield while the crew scans the skies for targets. Note the Zeltbahn shelter quarters covering slit-trenches in the background, as well the Junkers Ju-52/3m tri-motor transports in the background.

A Horch Kfz.15 hauls a Sd.Ah.51 trailer with an ammunition locker attached, while approximately a dozen men hitch a ride. Motorized anti-aircraft units also had to haul ready ammunition for their guns; the Sd.Ah.51 had at least two configurations of lockers that would fit the trailer using the same hooks and pins that would normally mount the 2cm gun.



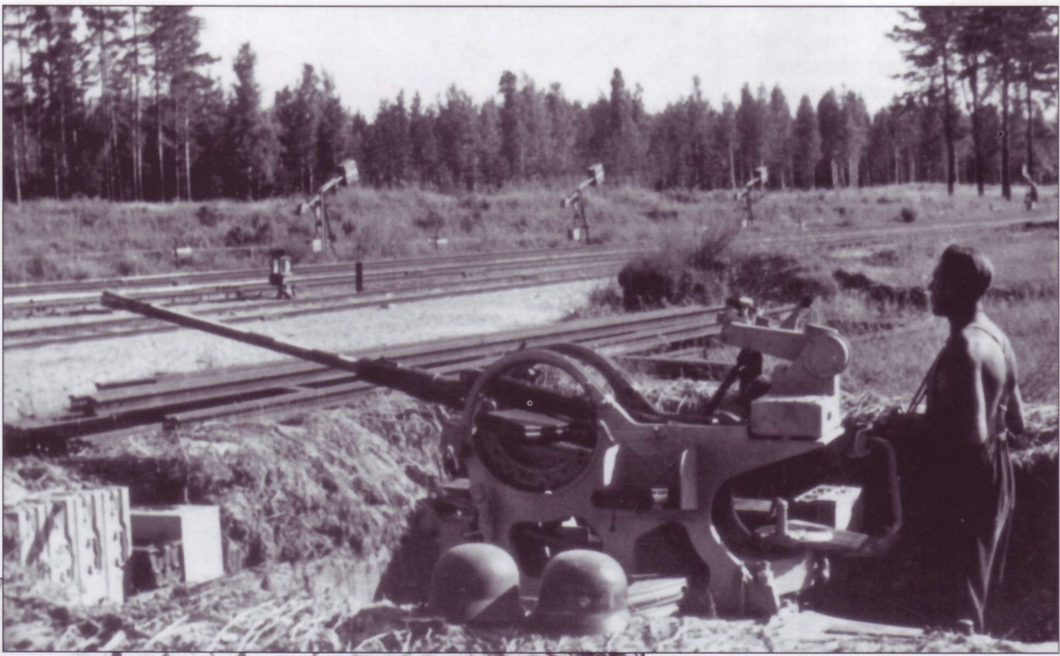


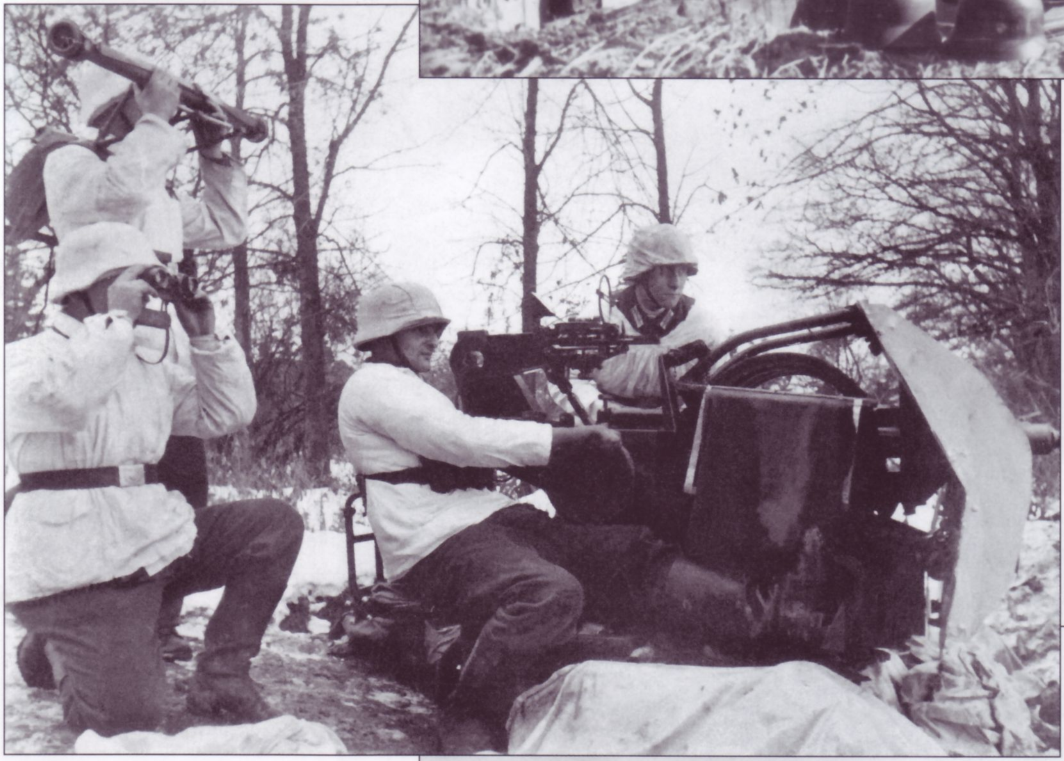
The crew of this 2cm FlaK38 wears SS-style camouflage smocks and helmet covers. Note how they scan the sky for targets and that the loader continues to grip the ammunition magazine that has been inserted into the receiver. One can also see the bearing rings which were used to elevate and depress the gun tube. The gun tube itself differs from that as seen on the FlaK30, notably in the configuration of the muzzle flash suppressor. Note also the different metal textures on the gun tube; these are not painted-on stripes.



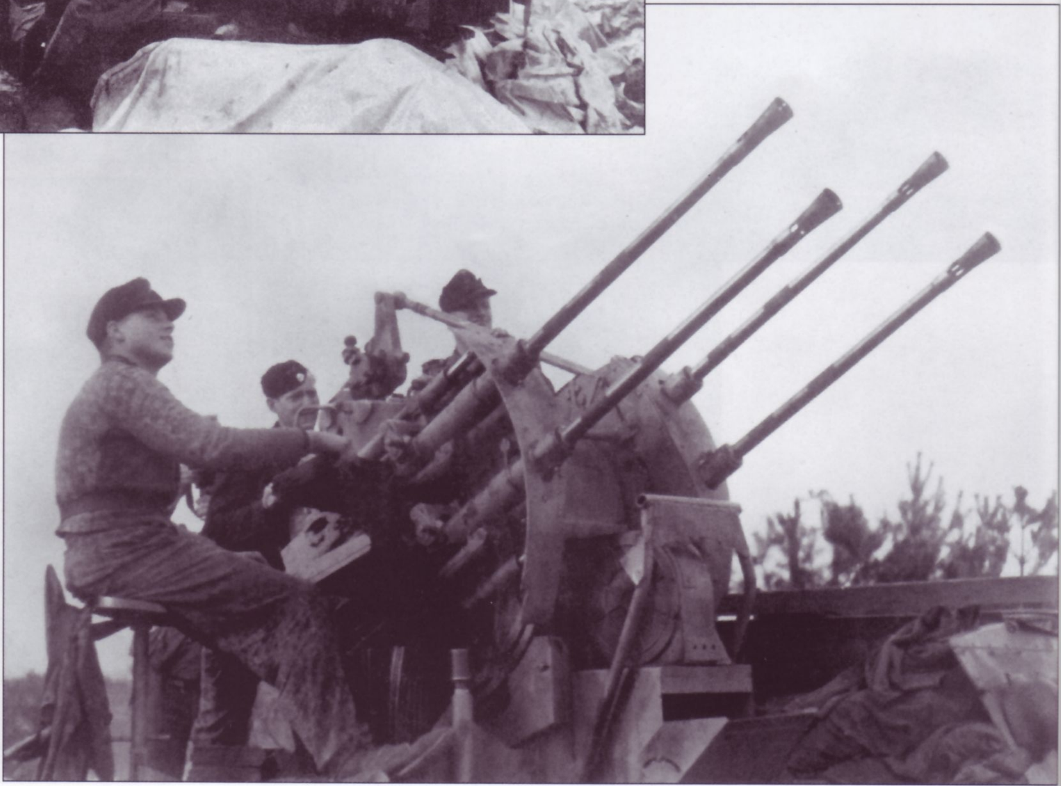
This 2cm FlaK38 has been emplaced on the snow-covered Russian steppes. The crewmen wear Waffen-SS camouflage smocks but no helmets; the lack of the latter suggests that this is a posed photograph. This gun has also been fitted with the main part of the splinter shields, but not the smaller part for the gunner and his sight mount.

Enjoying the fine weather, this shirtless member of the crew of this 2cm FlaK38 stands watch with his gun over a railhead; note the signal/switch devices on the far side of the tracks. This gun is painted overall in Dunkelgelb RAL 7028 and is without shields. Note the magazine in the gun's receiver as well as the second magazine in the ready tray. This crew has also emplaced their gun for better protection; note various items resting on or inside the parapet.



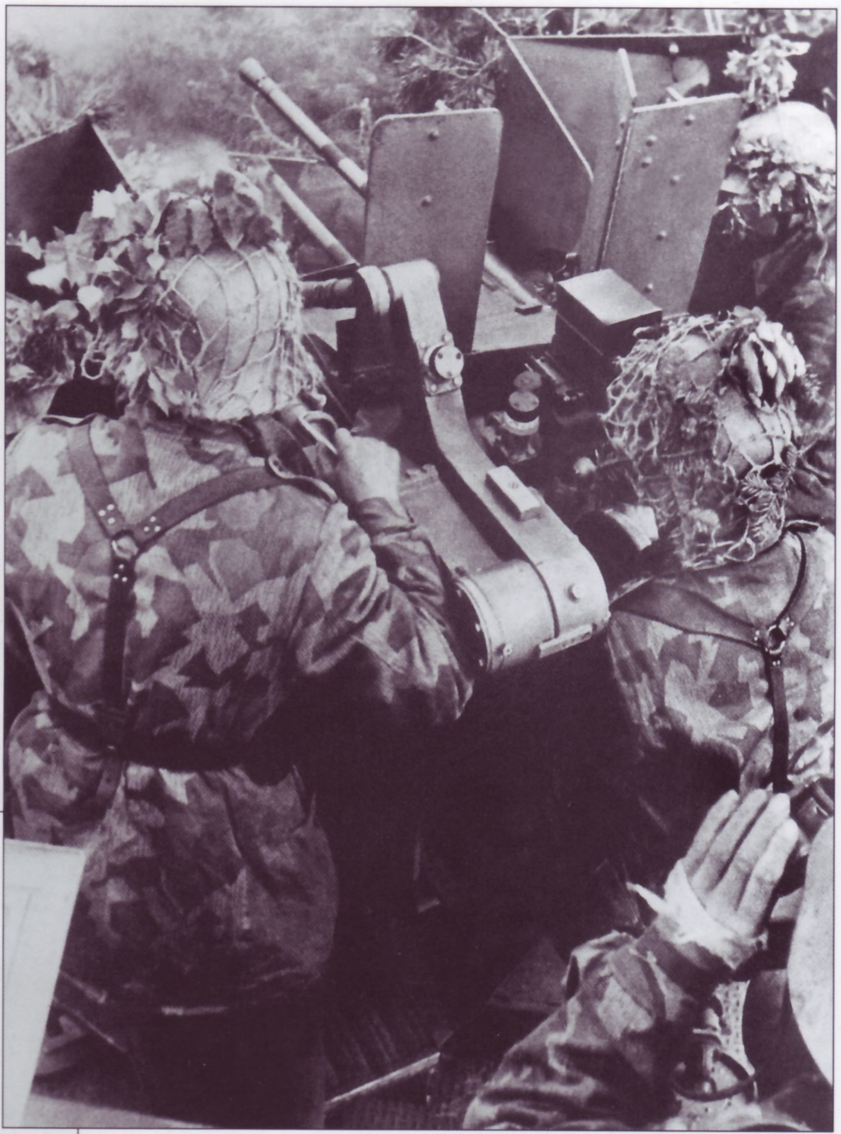


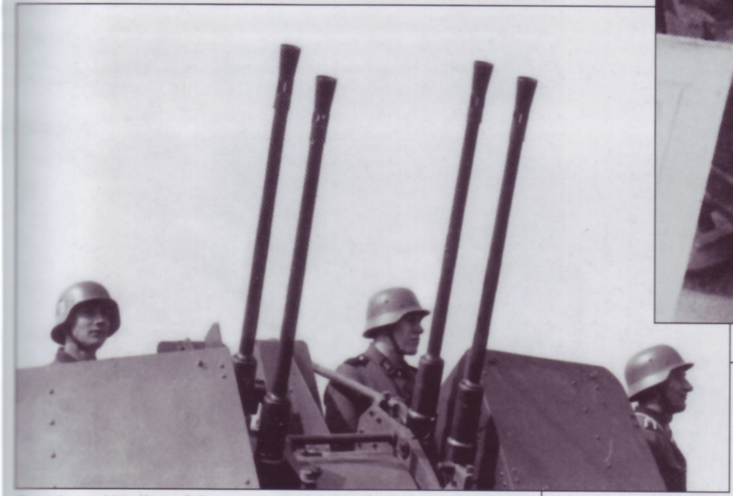
This Heer (Army) crew searches for ground targets while manning their 2cm FlaK38. The gun has partial shields that have been white-washed for better concealment in the snow; likewise, the crewmen wear their hooded parkas with the white side out, and have also covered their helmets with white cloth. The man at the rear is operating the R36 1-meter rangefinder from the shoulder mounts.



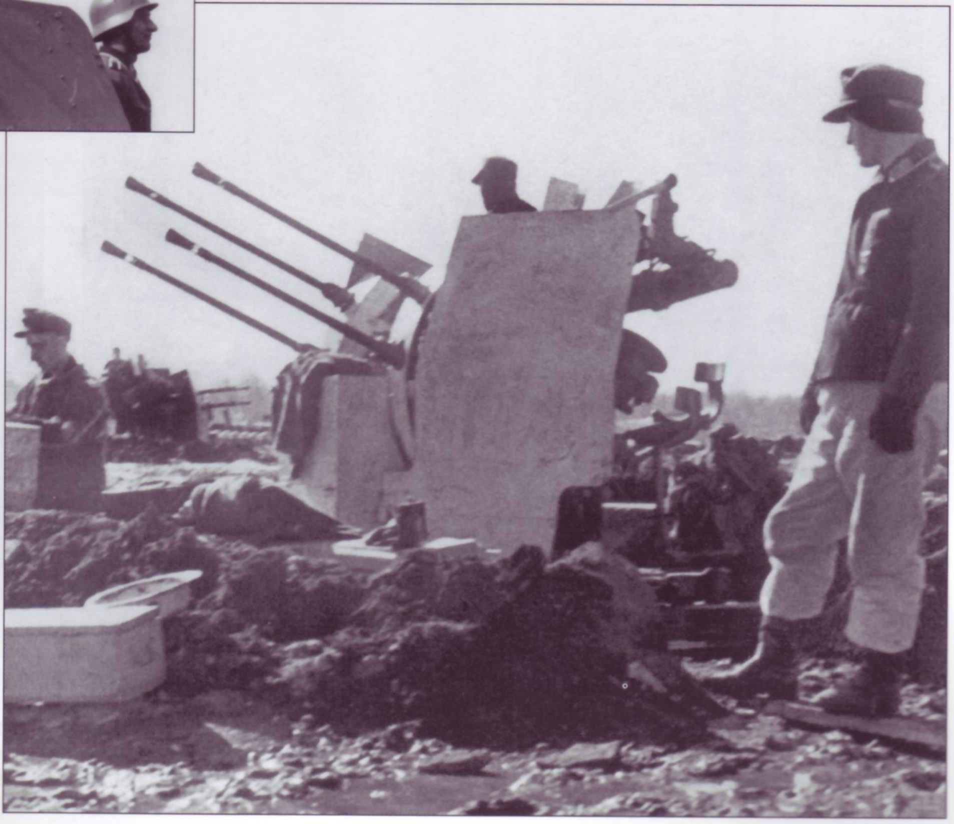
A Waffen-SS crew mans this 2cm Flakvierling 38, while posing for the photographer. Note how the near-side loader grips the ammunition magazine for the upper gun; most photos showing the gun in operation will also show the loaders on each side grasping both magazines, one with each hand. Presumably, with the mount firing in "full-auto", considerable vibration must occur, thus the need to ensure the magazines remain fully seated in place.

This photograph gives an excellent look at the so-called "rain/splinter" pattern camouflage tunics worn by Luftwaffe and Heer gun crews. Note also that the crewmen have taken pains to garnish their helmets as well as their 2cm Flakvierling 38 with foliage for maximum concealment.



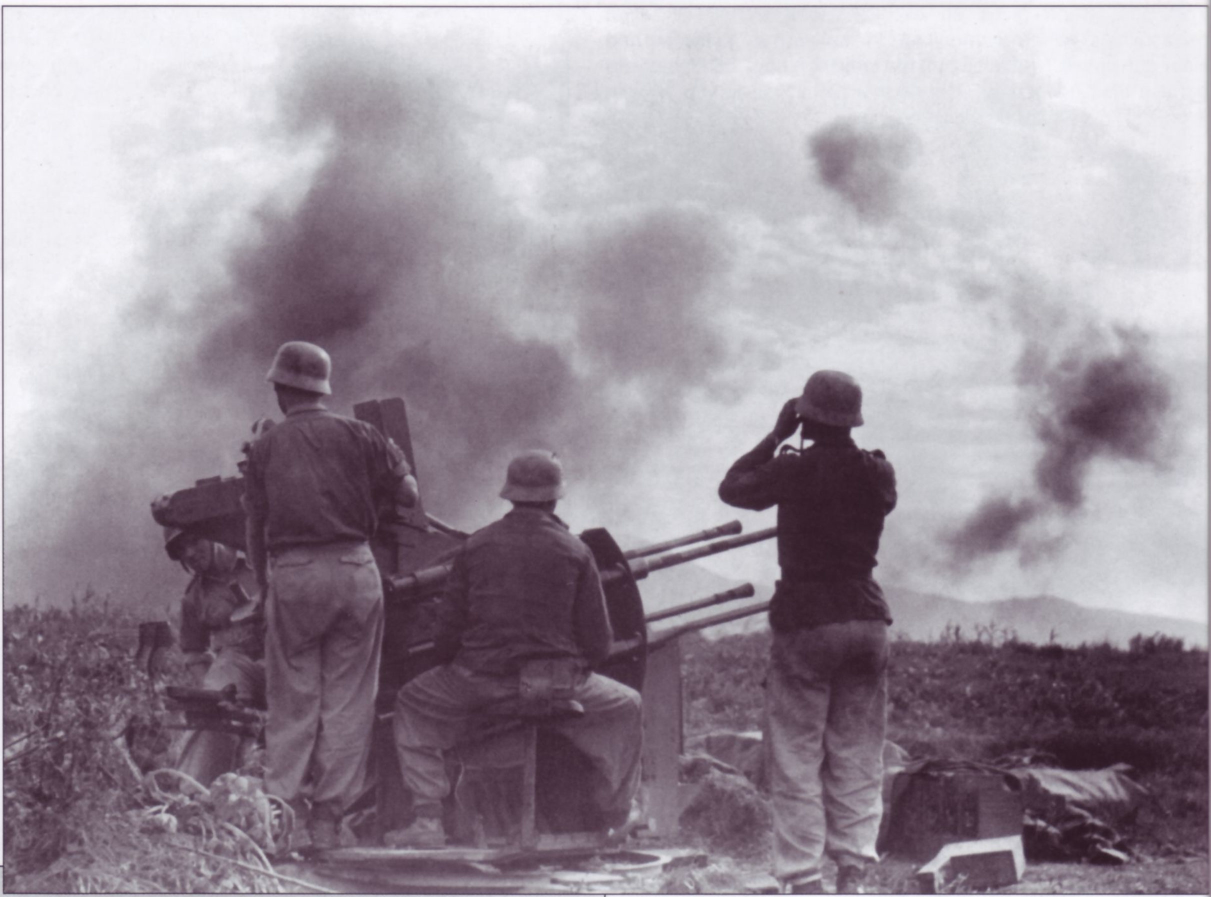


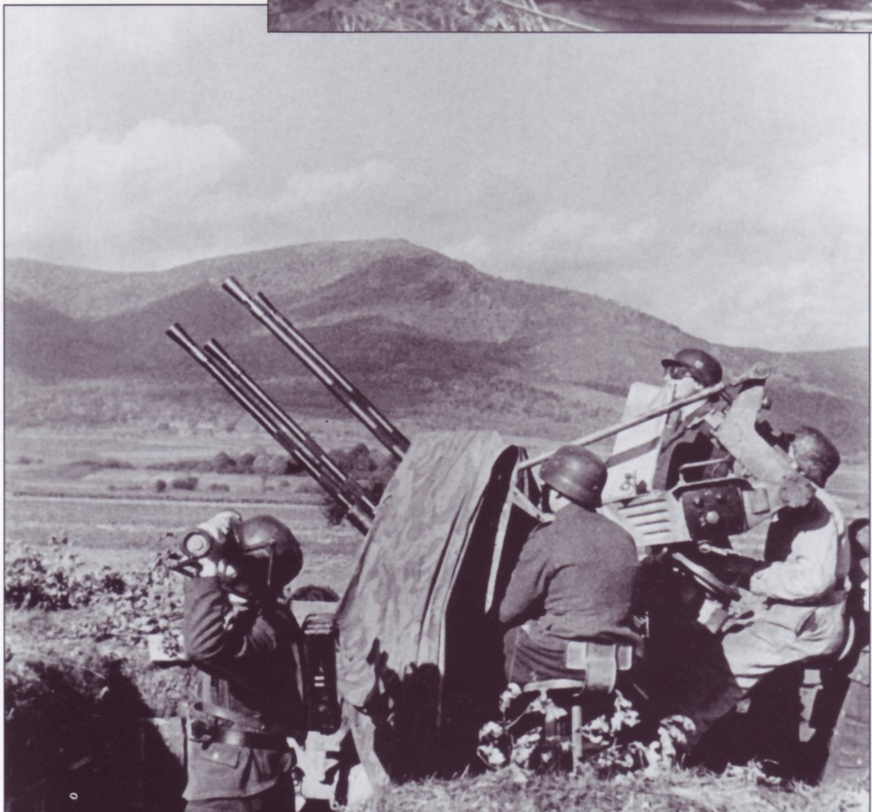
Another Waffen-SS crew stands by their 2cm Flakvierling 38. This gun has full shields; a close examination of the shields will reveal small eyelets attached at the corners and at the center of the shields. These would have wire or cord strung between them for the insertion of foliage and were a common feature of gun shields on most German ordnance.



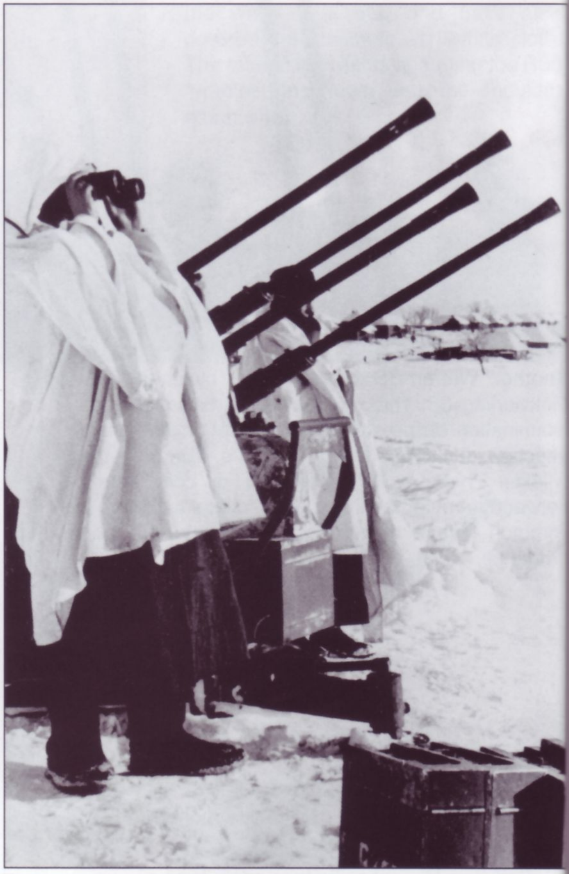
Surrounded by wet, muddy ground, the crew of this partially dug-in 2cm Flakvierling 38 stands by, while in the background, a second gun also stands ready. The crew has applied whitewash to their gun shield for winter camouflage, and the near crewman wears his padded winter trousers, white side out.

As smoke rises nearby, the crew of this 2cm Flakvierling 38 scans to their flank for more targets. Note that the gunner is not seated at his controls, so one wonders if the situation was at all critical when the photo was taken. At right, there are a number of ammunition containers, one of which lays sideways on the earth, with its lid opened.

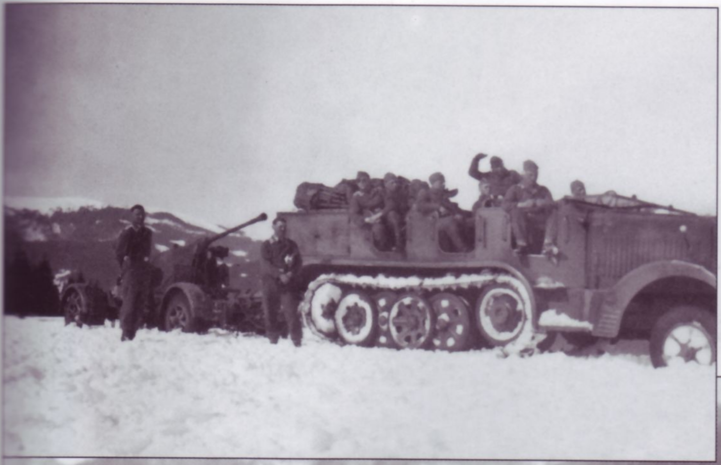




Guided by one man and his R36 1-meter rangefinder, the crew of this 2cm Flakvierling 38 searches for aerial targets. Note how the piece has been emplaced, but raised high enough for the guns to be depressed for use against ground targets. The crew has also hung some Zeltbahn camouflage shelter quarters on the shields to help conceal their weapon.

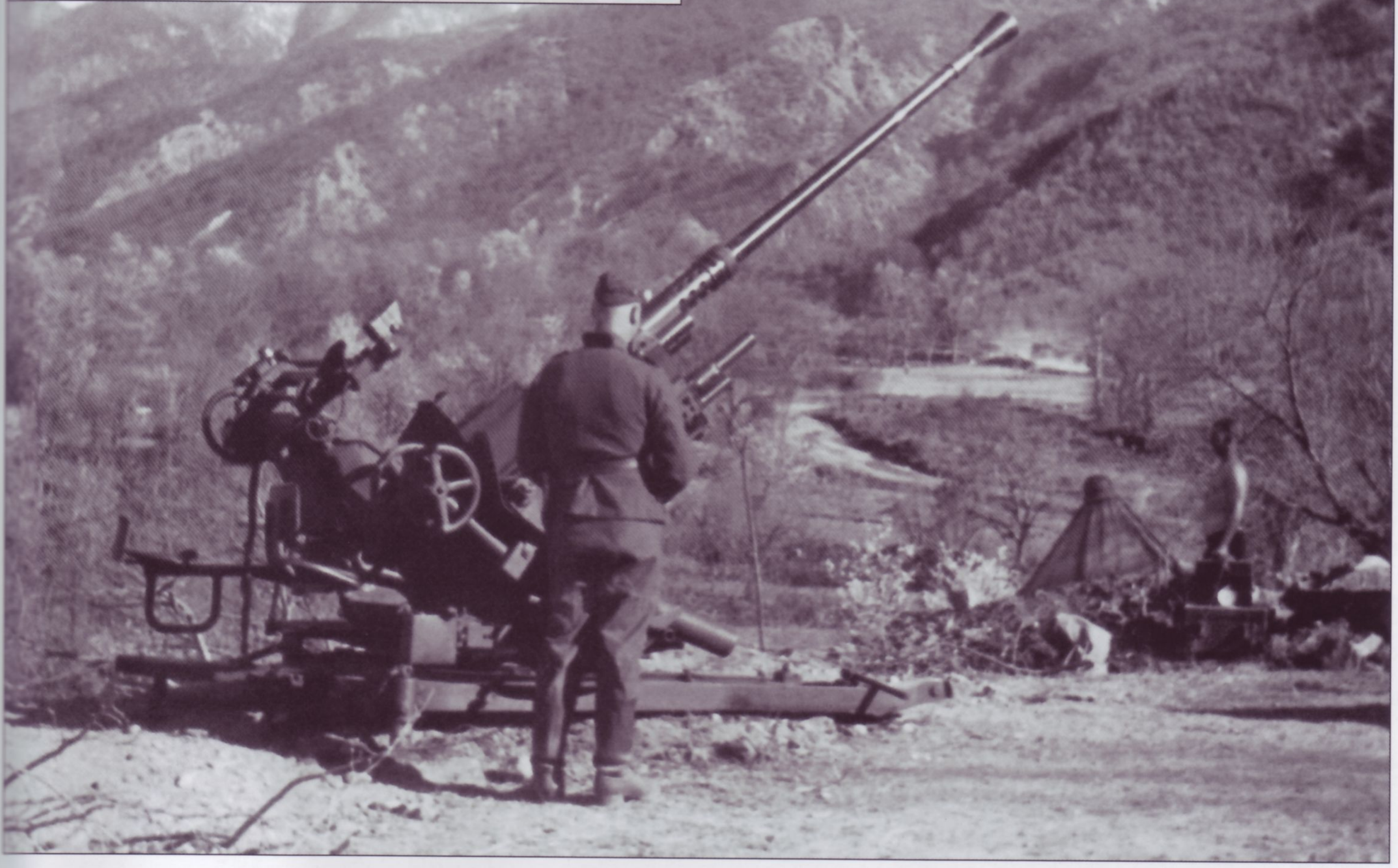


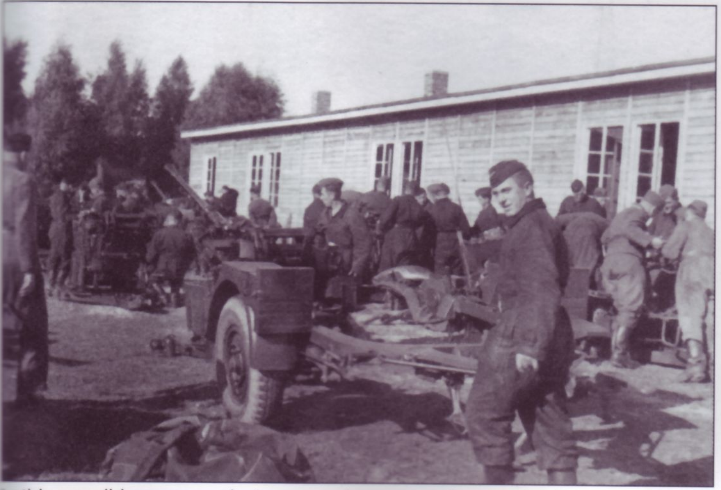
The crewmen of this 2cm Flakvierling 38 have "requisitioned white cloth in order to provide themselves with some mean of concealment against the snow-covered background. Not the box at the bottom of the gun mount, between the tw men; this caught expended ammunition cartridge cases. I the foreground sits a pair of ammunition containers; eac held two full 20-round magazines.



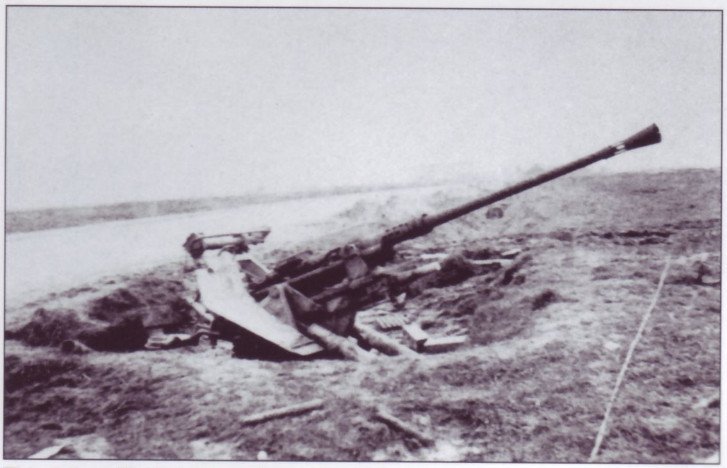
Hauled by an early mittlerer Zugkraftwagen 8-ton Sd.Kfz.7 with the KMm9 or 10 body style, a 3.7cm FlaK18 is seen here moving through snow. The gun is mounted on its twin-axle limber unit and is manned by a Luftwaffe crew. The tractor shows signs of being spray-painted in the pre-war three-color "feuersicherem Buntfarbenanstrich" camouflage scheme.

The crew of this 3.7cm FlaK36 enjoys their rather idyllic mountain setting as they attend to their camp duties. The gun is set out in the open on elevated ground so as to provide as wide a field of fire as possible against aerial targets. Note the crew's Zeltbahn shelter quarters topped off with a helmet, and the parapet of earth heaped around it for protection against light gunfire as well as the elements.

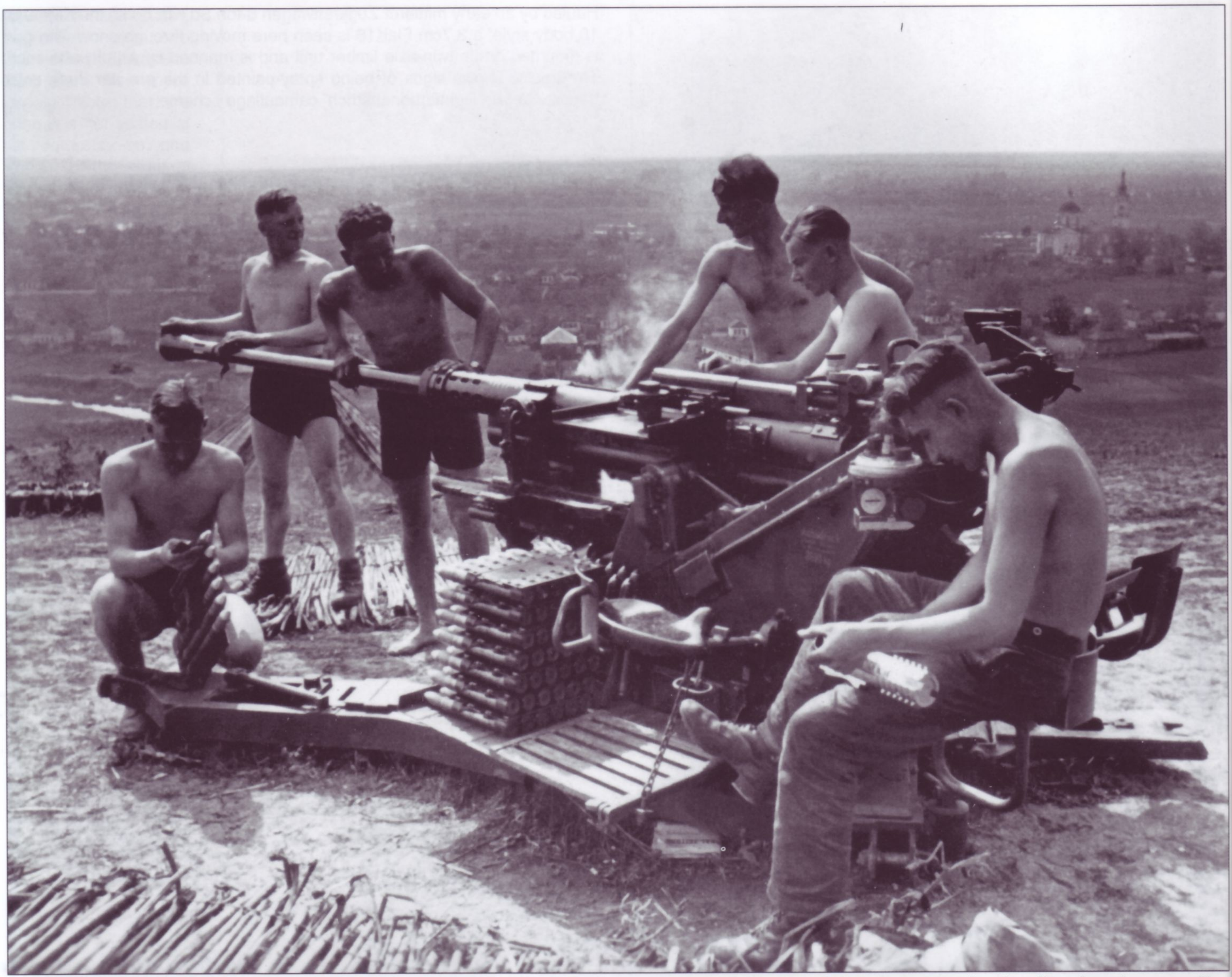




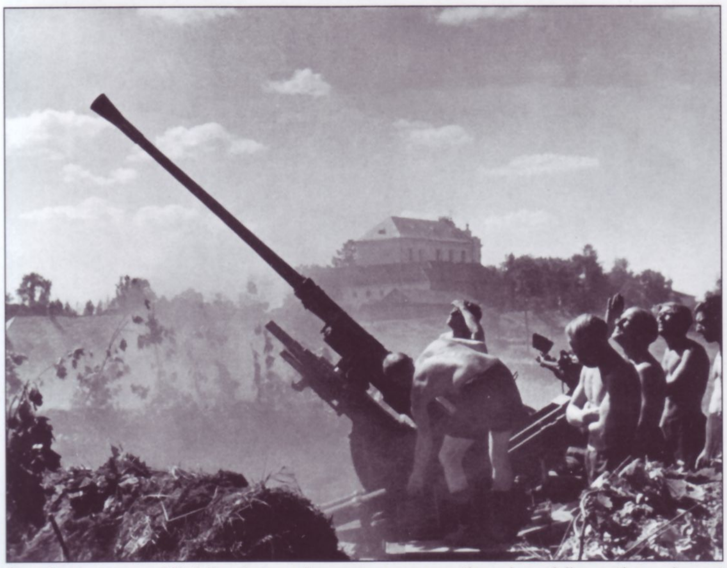
In this possibly pre-war photo, several crews work on maintaining their 3.7cm FlaK36s, in an area adjacent to their barracks. The guns have been detached from their Sd.Ah.52 limbers, affording a fine view of some details of the latter. Note also, the attitude of the limber when resting on its skid.



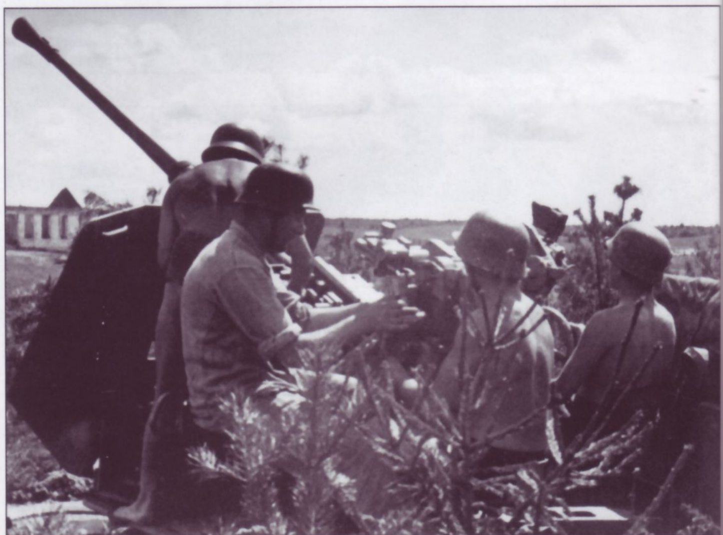
This 3.7cm FlaK36 is possibly a derelict, since very little in the way of crew gear or accessories are visible in the photograph, including any ready ammunition. Note the configuration of the gun tube with the perforations on the collar where it joins the receiver group, as well as the slots on the muzzle flash suppressor. This gun also has a partial shield on the gunner's side.



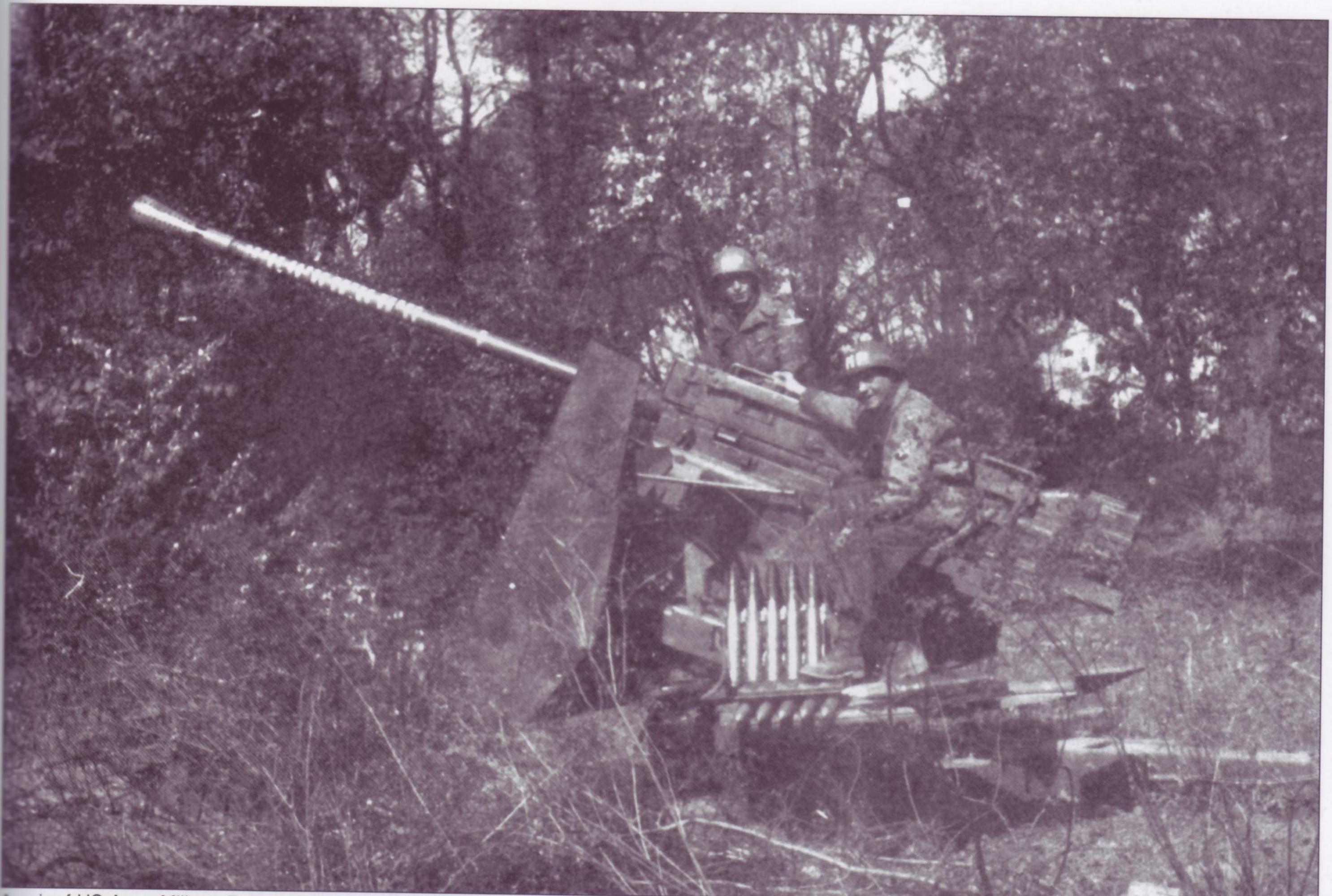
While some men take a break, other crew members of this 3.7cm FlaK36 attend to some maintenance. One man ensures that the clips of ready ammunition are properly cleaned, while the seated man seems to be working with what appears to be the bore swab/brush unit. Note also the small platforms made from thin tree limbs, which would be useful for the crew during wet weather in order to ensure proper footing in action.



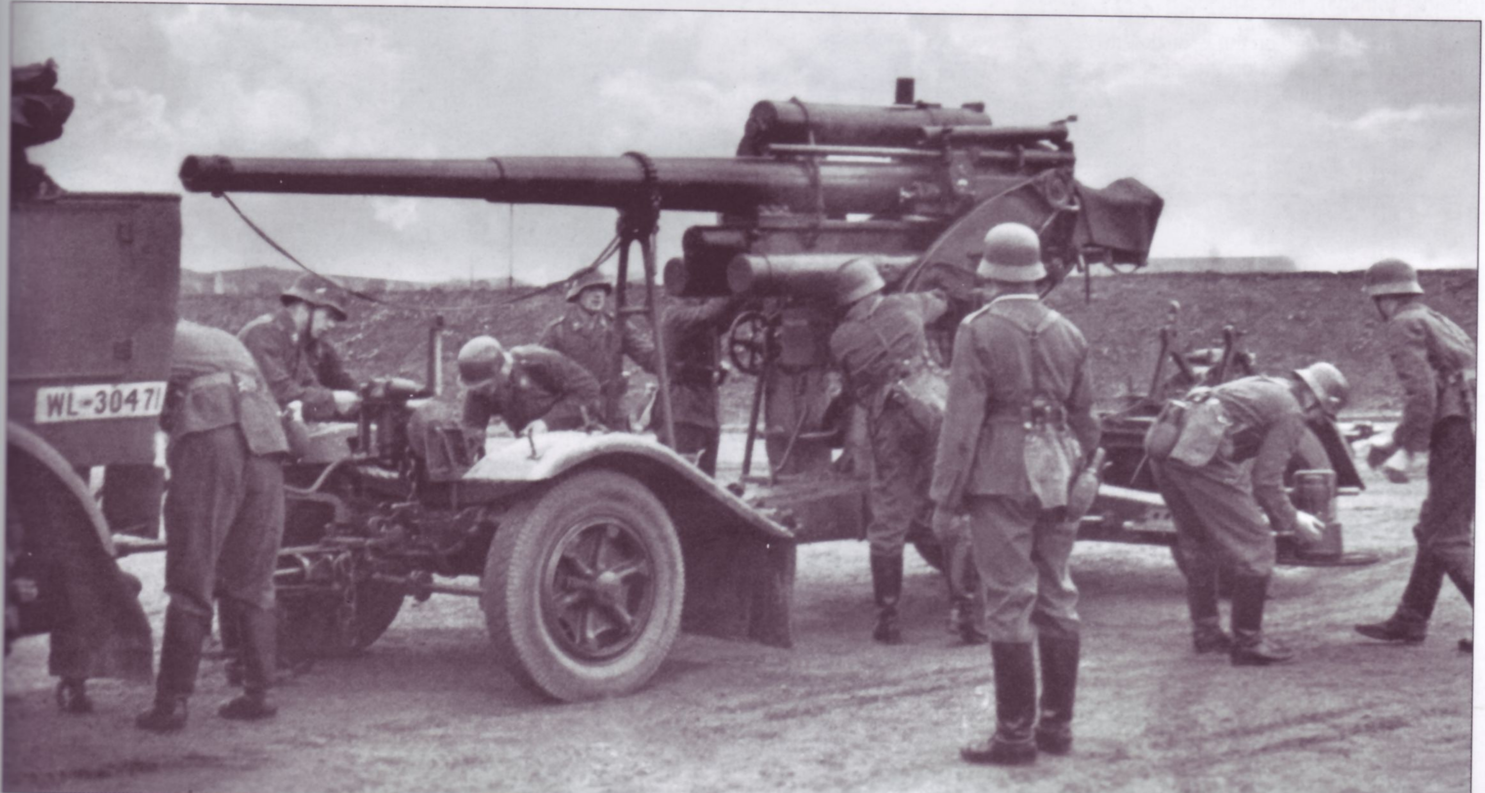
Another group of lightly-dressed crewmen scan the sky while gathered next to their 3.7cm FlaK36. They are located near a built-up area, which may hold a headquarters unit of a logistics center, which is typically where a medium FlaK gun such as this would be deployed. Note that the gun has been dug in and that vegetation has been spread around the parapet to make the turned earth less conspicuous.



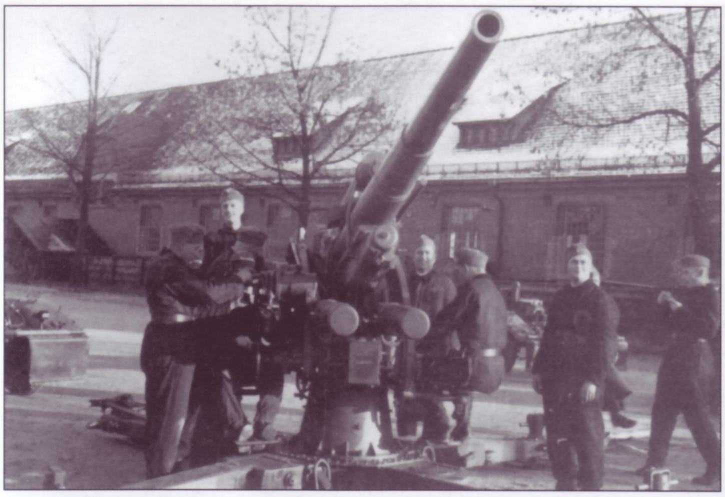
Judging by this series of photographs, it would seem that the crews of 3.7cm FlaK36s almost always worked in warm climates! Here we see another crew lightly-dressed, but wearing their steel helmets, indicating that they expec[t] some action. Their gun has also been emplaced in a shallow pit, with earth spoil piled around it to form a parapet; it too is covered with foliage to make it less conspicuous from the air. Note that this gun also has the shields fitted.



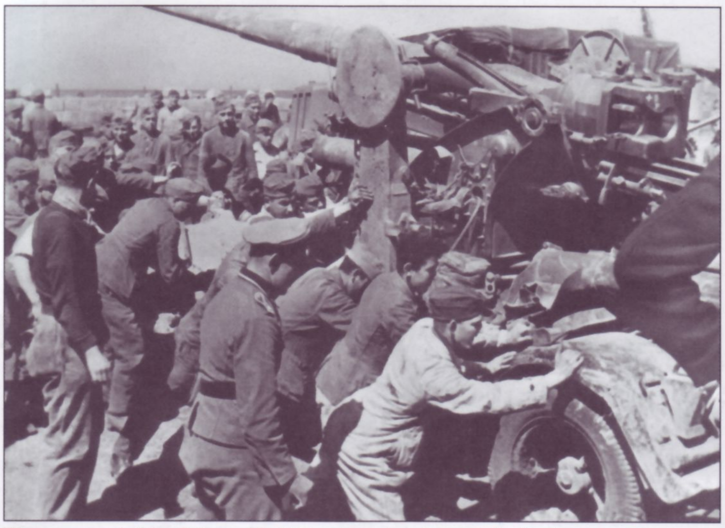
A pair of US Army Military Policemen poses with the rare 5cm FlaK41. Note the five-round ammunition clip at the feet of the near MP as well as the legs of the gun's cruciform mount; these differentiate this piece from the visually similar 3.7cm FlaK43. There are also kill-rings on the gun tube and a Schutzschild (splinter shield) fitted to the mount.



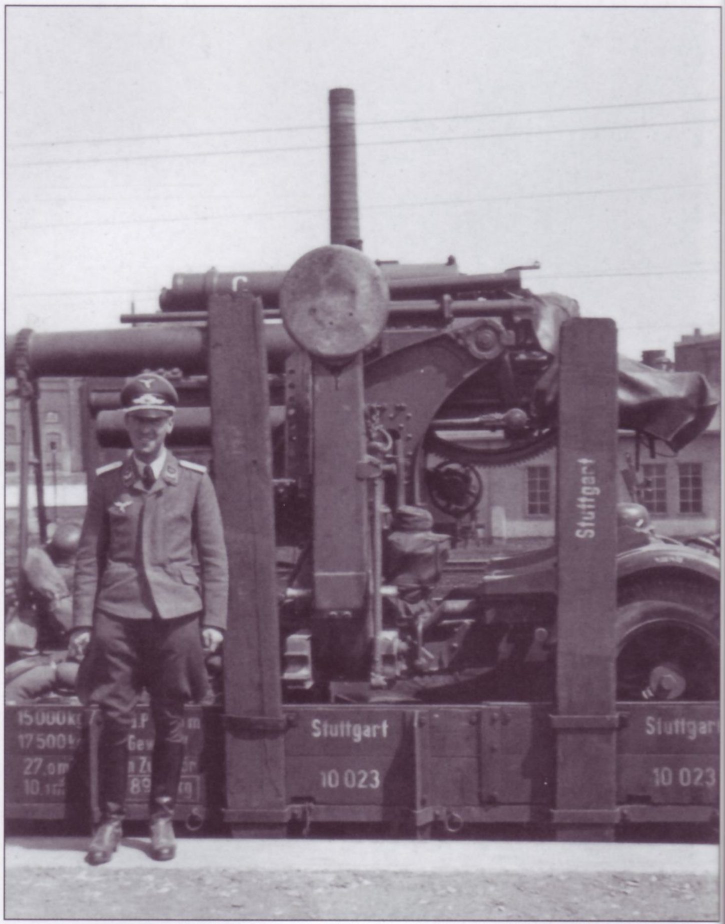
Under the watchful eyes of an NCO, this Luftwaffe crew of an 8.8cm FlaK18 is preparing their gun either to be moved or to be emplaced. Note the canvas covers on the breech and muzzle ends of the mono-block gun tube, as well as the configuration of the Sd.Ah.201 limber units. Both the gun and tractor (an Sd.Kfz.7) appear to be finished in the pre-war three-color "feuersicherem Buntfarbenanstrich" camouflage scheme; the tractor's is sprayed on with soft edges to the colors, while the gun is hand painted with hard edges to them. Note also the Luftwaffe registration plates, WL-30471.



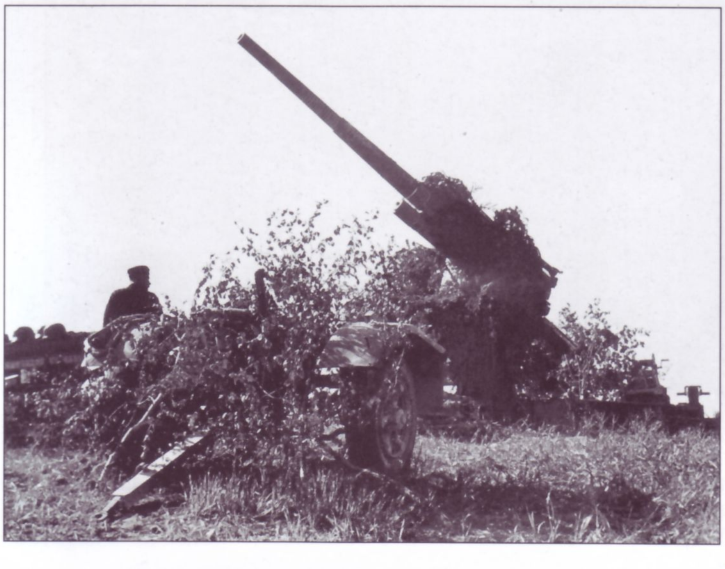
Located behind what is most probably their barracks, the crew of this 8.8cm FlaK18 performs maintenance on their piece. Note the Sd.Ah.201 limber units in the background and the clean appearance of their gun, in what is possibly a pre-war photograph.



The crew of this 8.8cm FlaK18 struggles to get their piece ready to be emplaced or for travel; note the Sd.Kfz.7 tractor in the background. The FlaK18 was mounted on the Kreuzlafette 18, which was easily recognized by the round leveling pads on the legs, as seen here. This piece also mounts a mono-block gun tube.

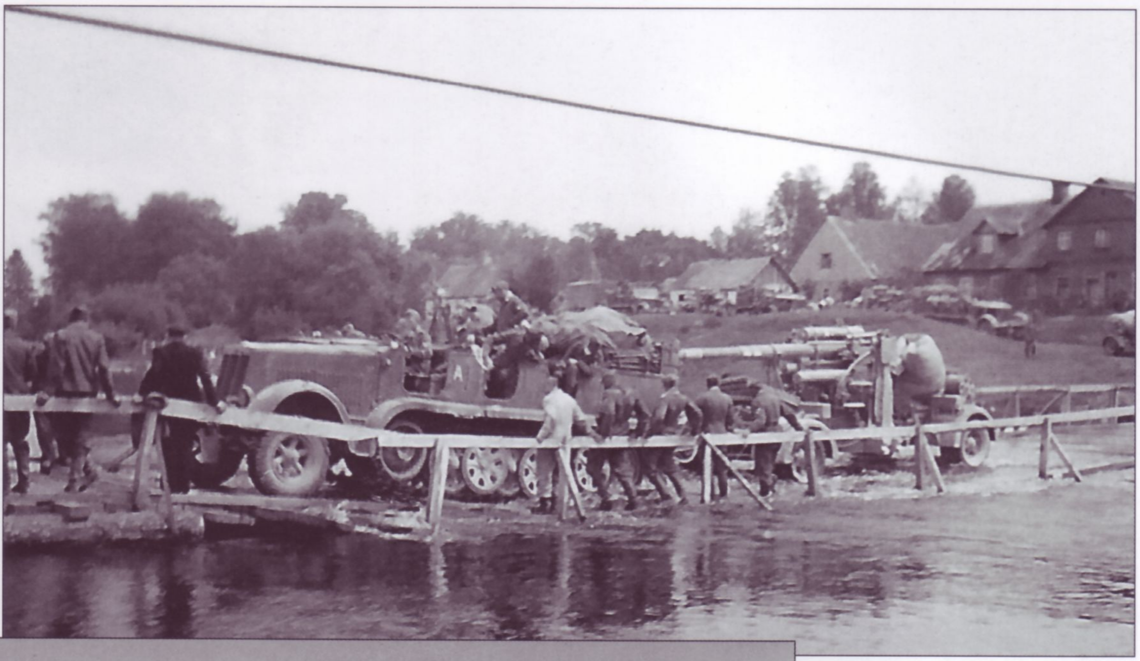


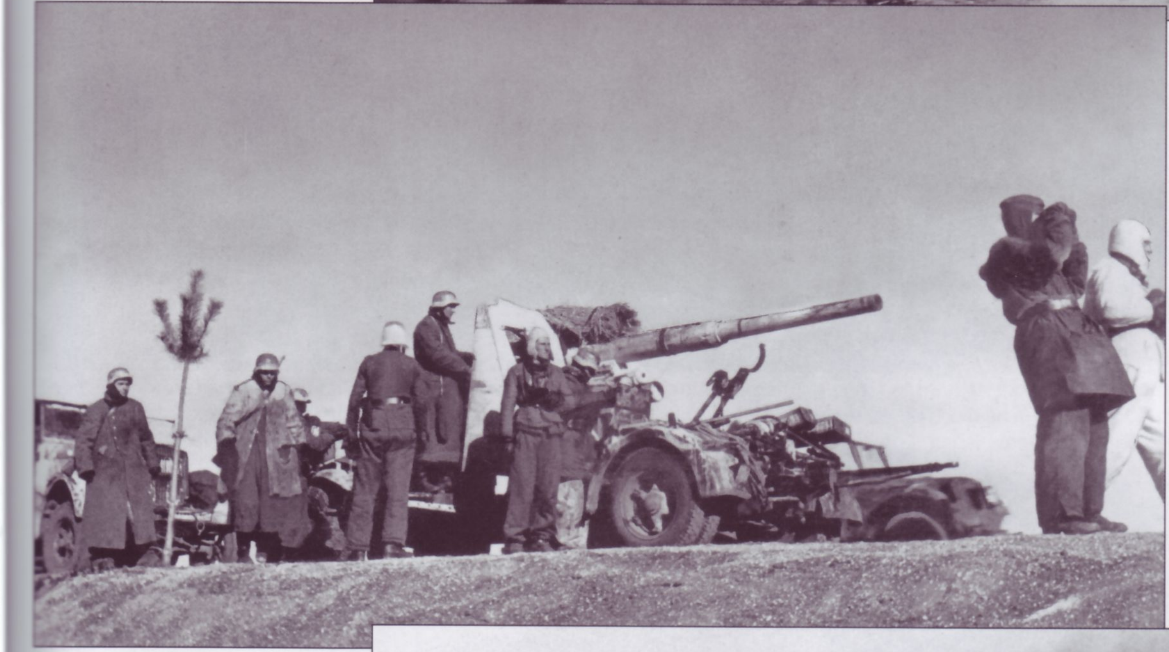
A Luftwaffe officer poses proudly next to his 8.8cm FlaK18, which is being carried on a rail-road flat car. The gun is recognized as a FlaK18 by the round leveling pads of the Kreuzlafette 18. Note the cover over the breech end of this typically clean gun as well as the crewmen's personal equipment and gear laying about.



The crew of this 8.8cm FlaK18 has used some local foliage in order to conceal their gun from prying eyes. Note the Sd.Ah.201 limber section on the foreground, which identifies the particular model of gun, which is mounted on the Kreuzlafette 18 (cruciform mount). At left, ammunition is stacked ready for use, with the crew's helmets on top for quick access.

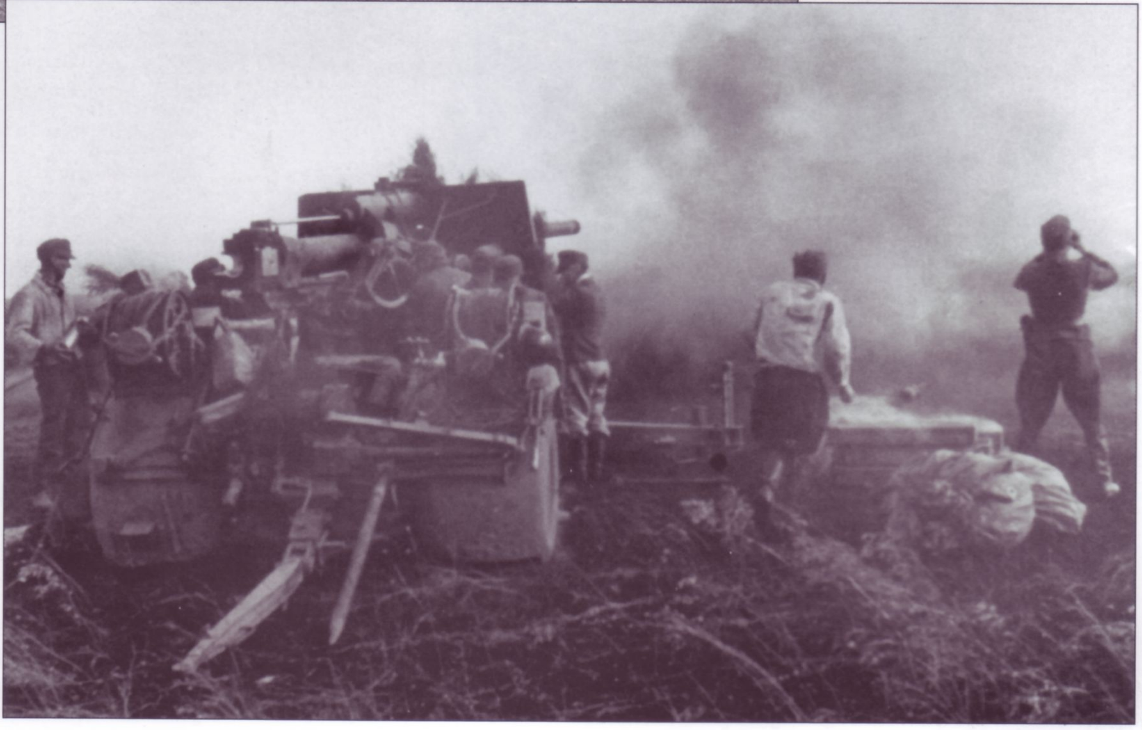
This 8.8cm FlaK36 or 37 crosses a small floating bridge behind its tractor, a mittlerer Zugkraftwagen 8-ton Sd.Kfz.7. The gun is mounted on the Kreuzlafette 36, which is identified by the Sd.Ah.202 limber units and the square leveling pads on the platform's folding legs. Note the gun-in-battery letter, an "A", painted in white on the side of the tractor. The "A" also appears in white on the gun's recuperator cylinder, while two tank silhouettes representing destroyed French Char B1 bis heavy tanks are seen on the monoblock gun tube.

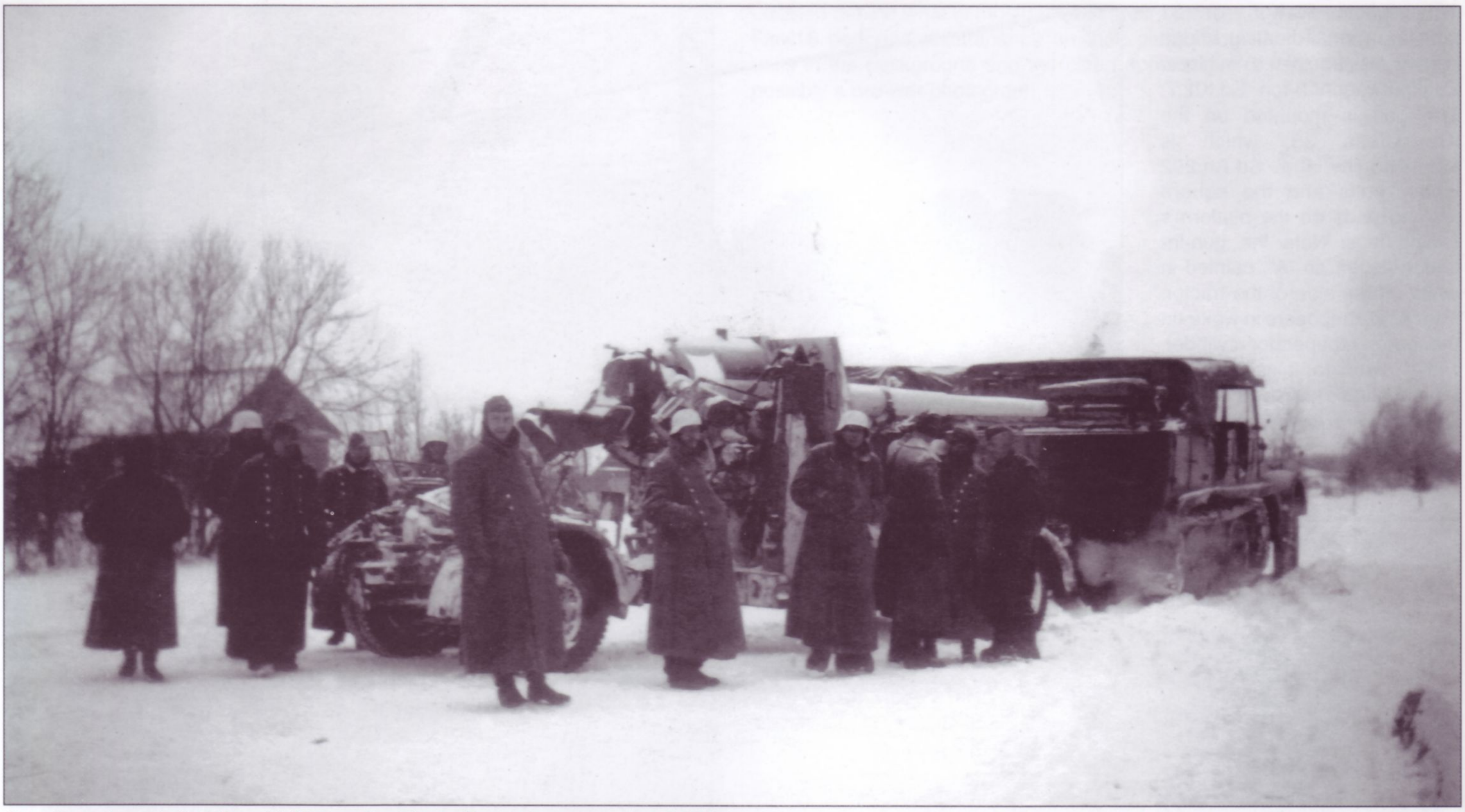




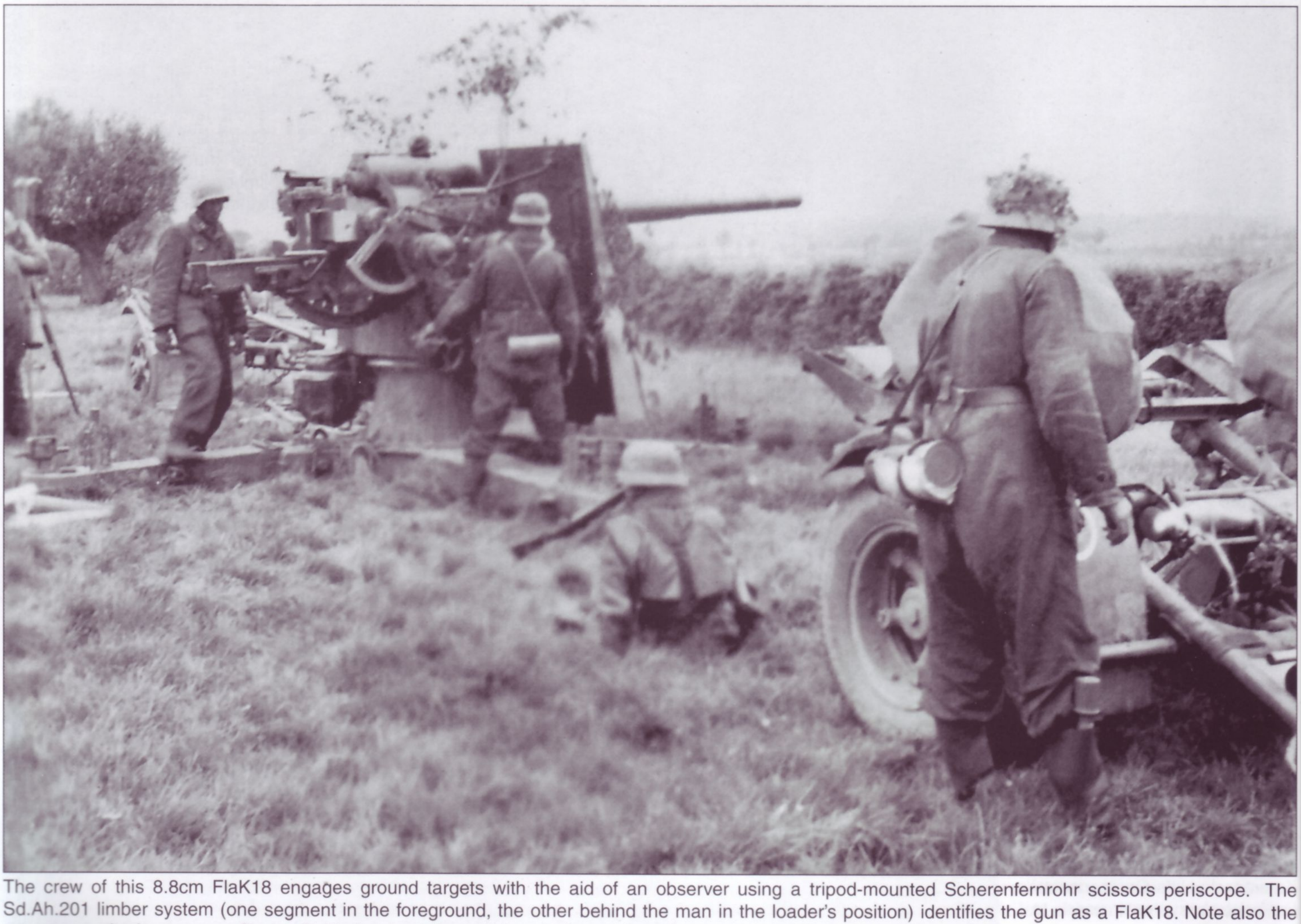
It would appear that this 8.8cm FlaK36 or 37 is being set up in a hasty mode to engage a ground target of opportunity. Note the man standing on one extended leg of the Kreuzlafette 36, the open shutter in front of the Flakzielfernrohr 20 or 20E direct-fire gun-sight and the opened gun tube travel lock leaning forward below the sectional gun tube. The Schutzschild (splinter shields) and much of the gun and limbers are over-painted with a winter whitewash.

The crew of this 8.8cm FlaK36 or 37 works their gun at a rather frantic pace as they engage enemy ground targets. Note the earth anchor fitted at the end of the Kreuzlafette 36's stabilizing leg, to steady the gun. The gun tube is in full recoil and the near Sd.Ah.202 limber unit carries reels for the cable that hard-wired the battery's guns to the Kommando-Hilfs-Gerät central fire-control system, used to engage aerial targets.

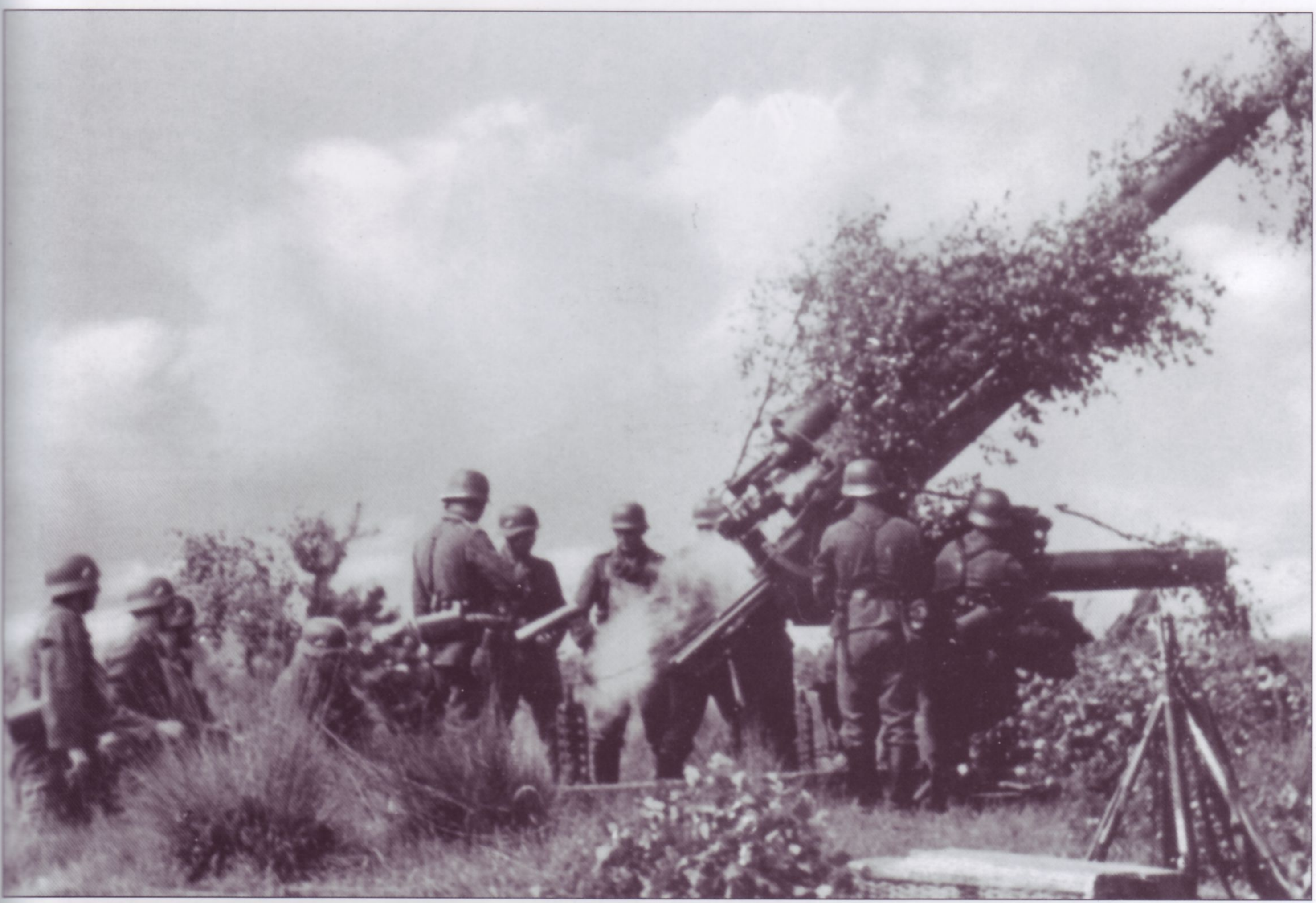




Standing about their 8.8cm FlaK36 and mittlerer Zugkraftwagen 8-ton Sd.Kfz.7, this gun crew stretches their legs in the Russian snow. The gun is identified as a FlaK36 by the circular Lampenempfänger (light signal receiver) dials, as well as the square leveling pads on the legs of the Kreuzlafette 36 cruciform mount. This gun also has Schutzschild (splinter shields) and mounts the mono-block gun tube.

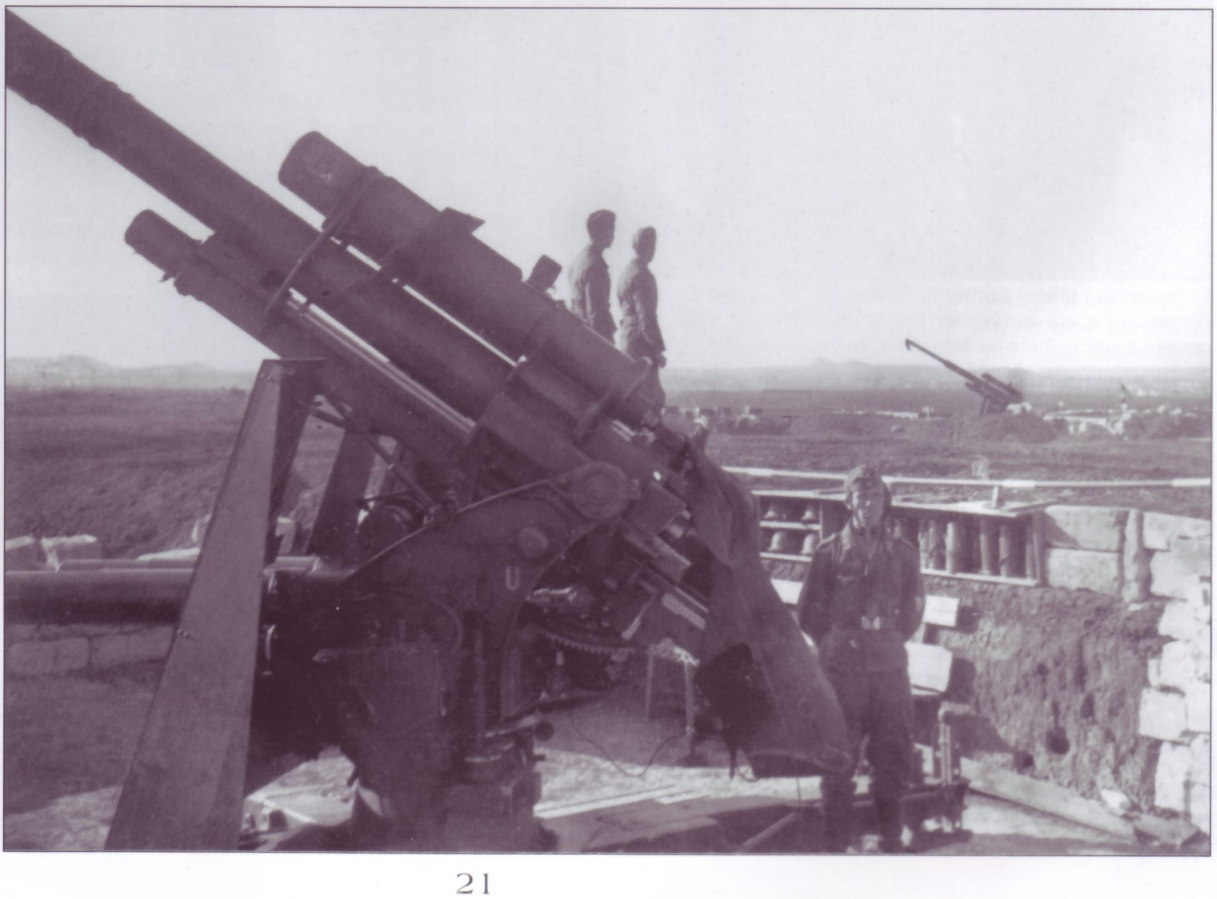


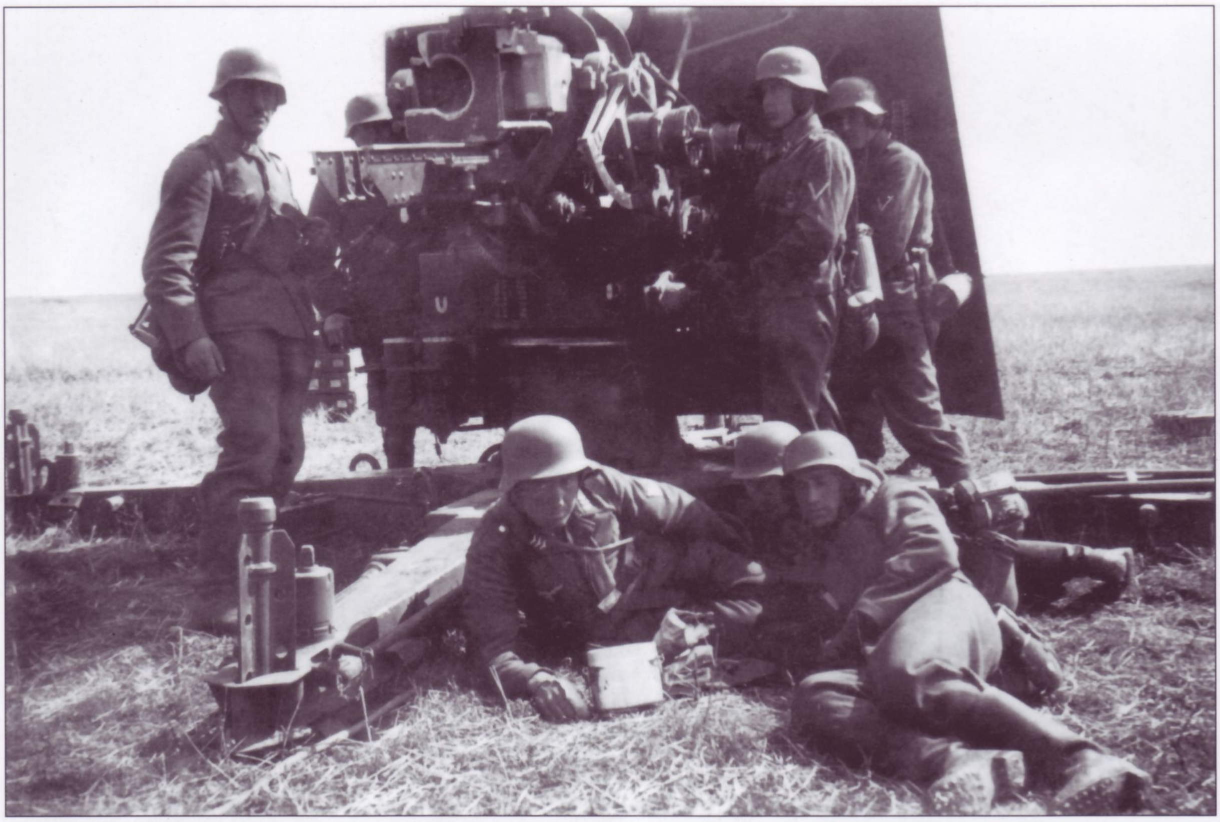
The crew of this 8.8cm FlaK18 engages ground targets with the aid of an observer using a tripod-mounted Scherenfernrohr scissors periscope. The Sd.Ah.201 limber system (one segment in the foreground, the other behind the man in the loader's position) identifies the gun as a FlaK18. Note also the covers over the Lampenempfänger (light signal receiver) dials, which would not be used when the gun was firing at a ground target.



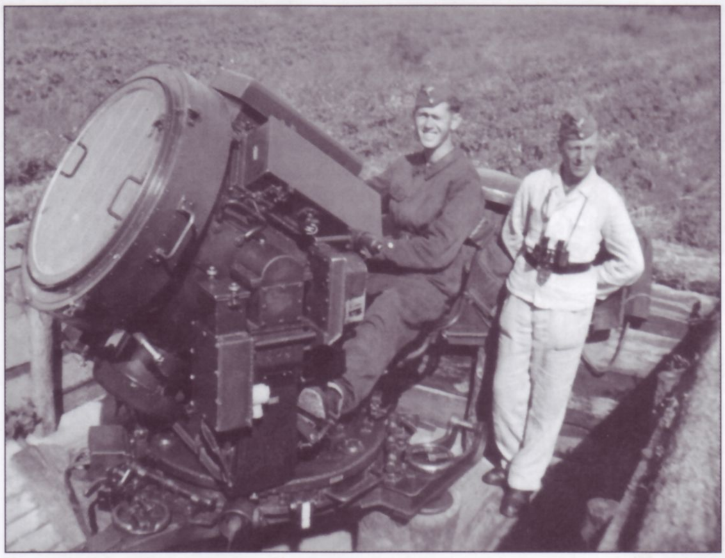
The crew of this partially-camouflaged 8.8cm FlaK18 engages an aerial target; the angle of the gun tube, the position and attitude of the gun-layer on the near side of the piece and the ammunition handlers at the ready all suggest that they are laying down an anti-aircraft barrage. The location of the earth anchor on the Kreuzlafette 18, seen just below the gas escaping from the gun breech, identifies the model type. Note also that the crew has "stacked arms" (their Kar98k rifles are hooked together in a pyramid shape) and that there is a wicker three-round ammunition container in the foreground.

Members of a Luftwaffe 8.8cm FlaK36 gun battery stand by their emplaced pieces; the nearest piece is identified by the position of the earth anchor at the tip of the Kreuzlafette 36's legs. Note the variety of materials used to line the parapet of the gun pit; this includes concrete blocks, wood and some wicker-work. Small cubby-holes in the walls hold such items as the crew's steel helmets. There are several other details of note in this image. For instance, the upper edge of the main Schutzschild (splinter shields) has come undone; there is a letter "U" on the gun's cradle and a canvas cover hanging partially opened on the breech; finally, note the small auxiliary shield on the recuperator cylinder.

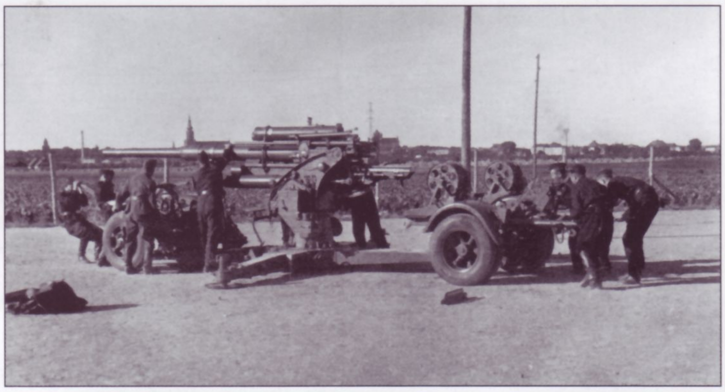




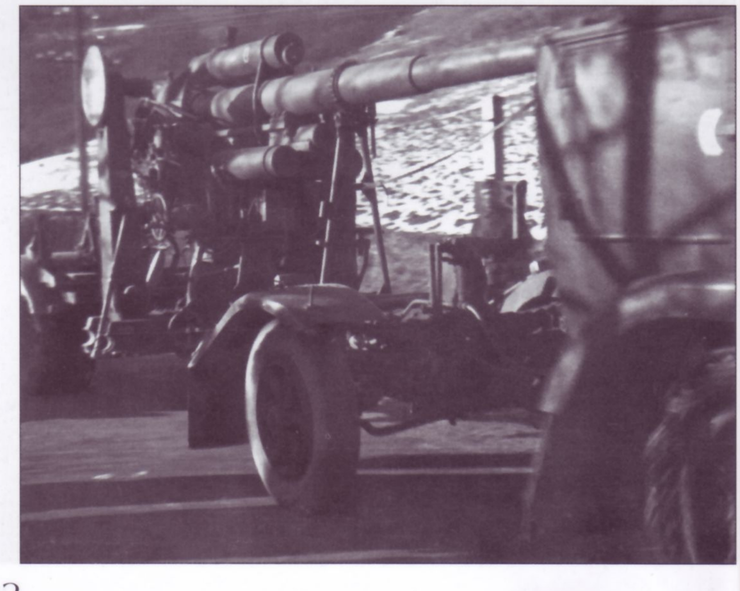
While some of the crewmen stand at their positions, several others have taken a relaxed pose for the photographer of this 8.8cm FlaK36. This Luftwaffe gun is fitted with the Schutzschild (splinter shields); note also the earth anchors used to steady the piece, which are placed at each end of the cruciform gun mount. Their positions denote the Kreuzlafette 36, which identifies this particular model of gun.



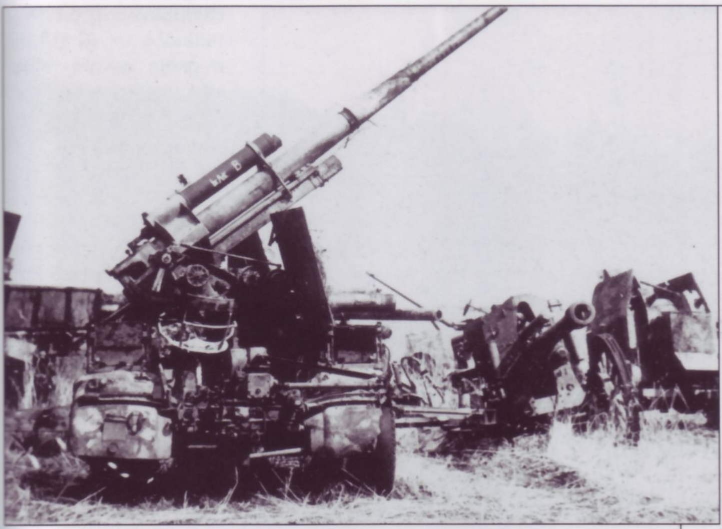
Presumably, these Luftwaffe crewmen assigned to this 60cm FlaK-Scheinwerfer are posing for the photographer in their normal "in-action" positions since there is little else they can do with their apparatus until lighting conditions change. As the war continued, anti-aircraft batteries were alerted and cued by radar, but this piece of equipment remained a vital segment in the overall command and control system. Shutters within the unit could focus or disperse the light as directed, and were operated by the standing crewman (designated K2); the seated man (designated K1) directed the device using a pair of hand-cranks. With a mount based on components of the 2cm FlaK, the unit was transported on the standard Sd.Ah.51 limber.



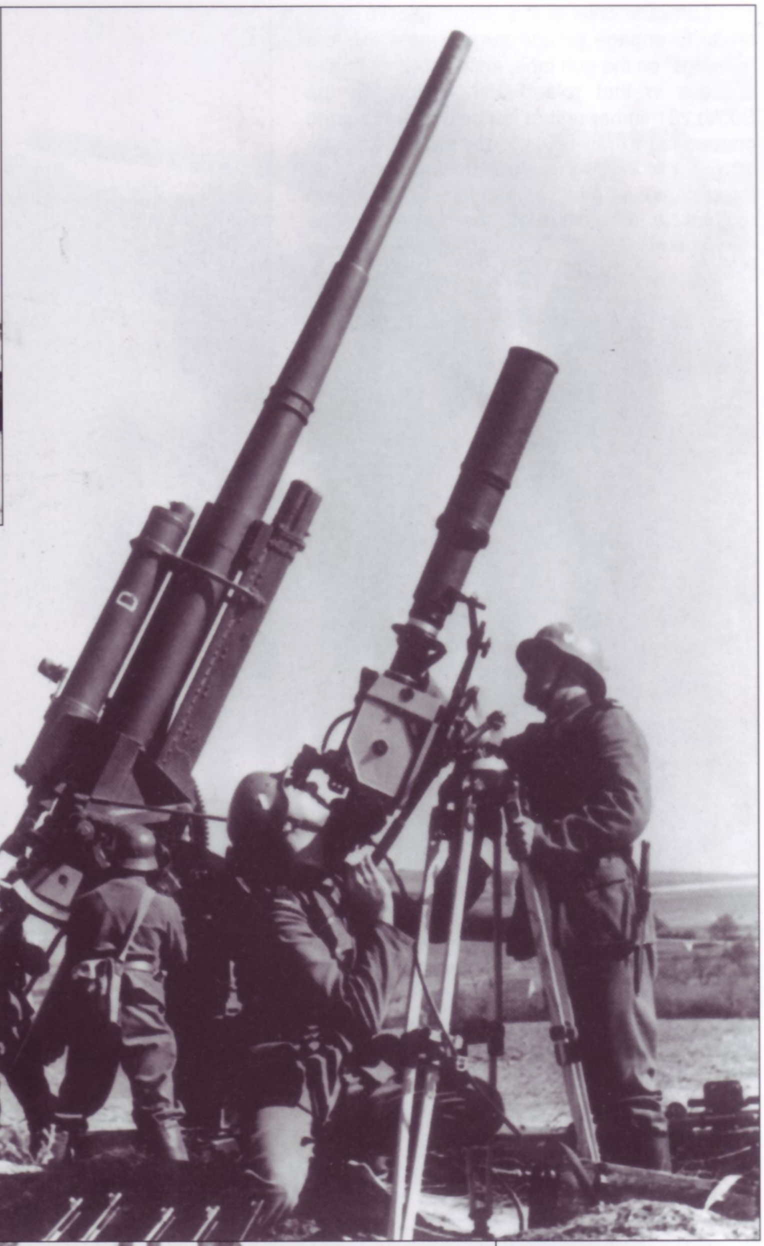
This interesting photograph depicts the crew of an 8.8cm FlaK18 as they either prepare their gun for action, or for transport. Note how the crew manipulates the Sd.Ah.201 limber units, which readily identify this specific sub-type. Note also that it mounts the sectional gun tube, which itself could fit the FlaK18, 36 or 37; the use of this particular item was not an identifying feature of any specific model of the "eighty-eight".



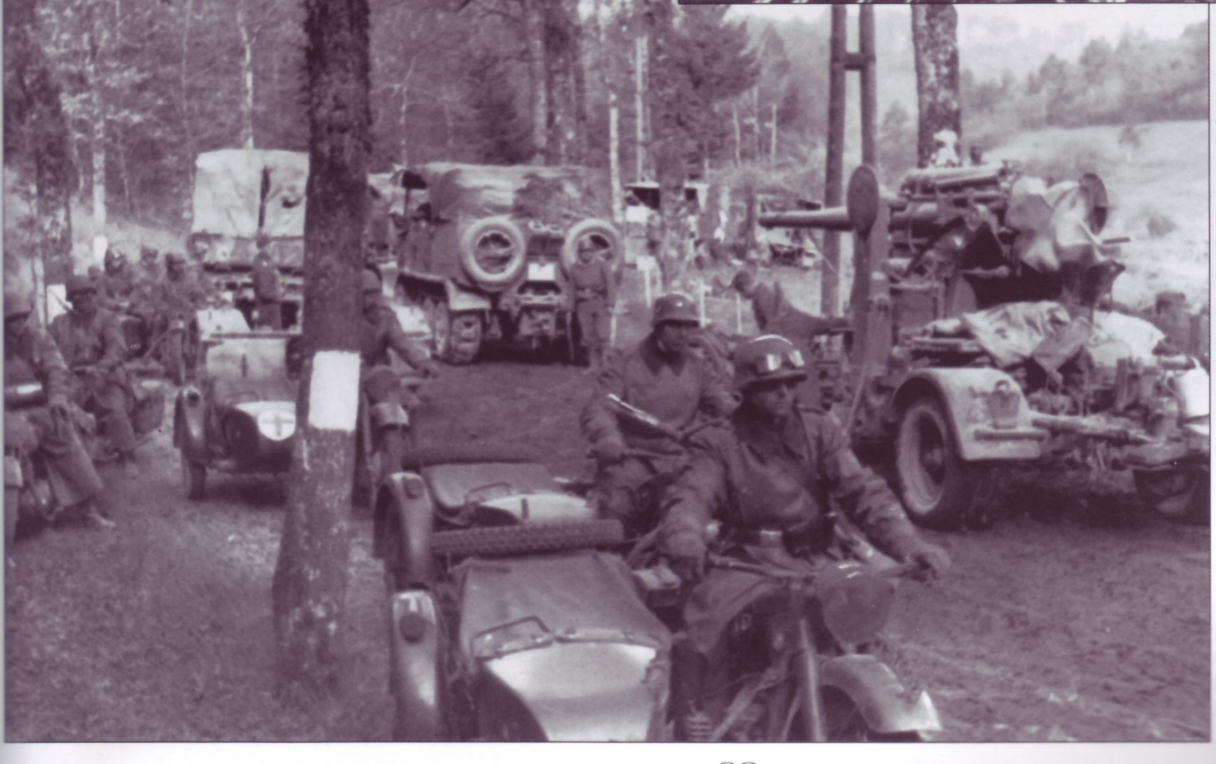
This 8.8cm FlaK18 is being hauled behind the standard tractor for the gun's weight class, the mittlerer Zugkraftwagen 8-ton Sd.Kfz.7. The round leveling pads and the Sd.Ah.201 identify the piece as a FlaK18, it being mounted on the Kreuzlafette 18. Another feature of this gun is that, unlike the later FlaK36 or FlaK37, it is normally towed with the gun tube facing forward; on the other guns, it faces aft. Note also the gun-in-battery letter, "D", on the recuperator cylinder.



This photograph depicts several pieces of destroyed German artillery, including an 8.8cm FlaK36 on its Sd.Ah.202 limber units. The FlaK gun has the mono-block gun tube, a Schutzschild (splinter shields) and Lampenempfänger (light signal receiver) dials; the latter in combination with the Sd.Ah.202 limber units designates the gun type. In the center of the photo is a 10.5cm l.FH18M with muzzle break. This feature allowed for a slight increase in the howitzer's range since it helped counteract the extra recoil forces brought on by the use of a more powerful gunpowder charge. At far right are the remains of a 2cm Flakvierling 38, minus its four gun tubes, on its Sd.Ah.52 limber.

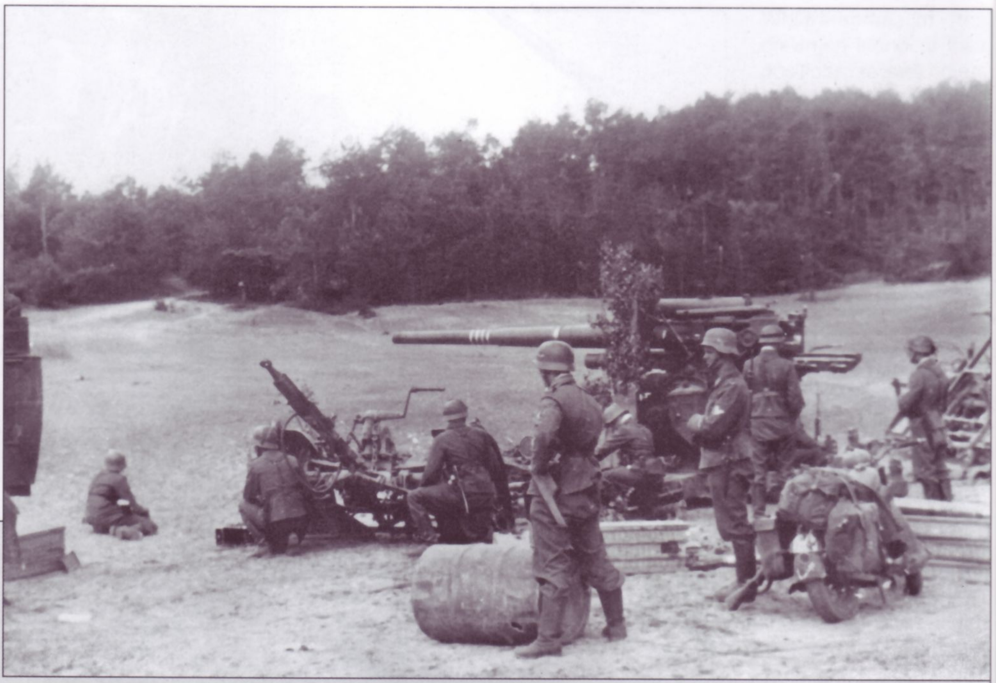


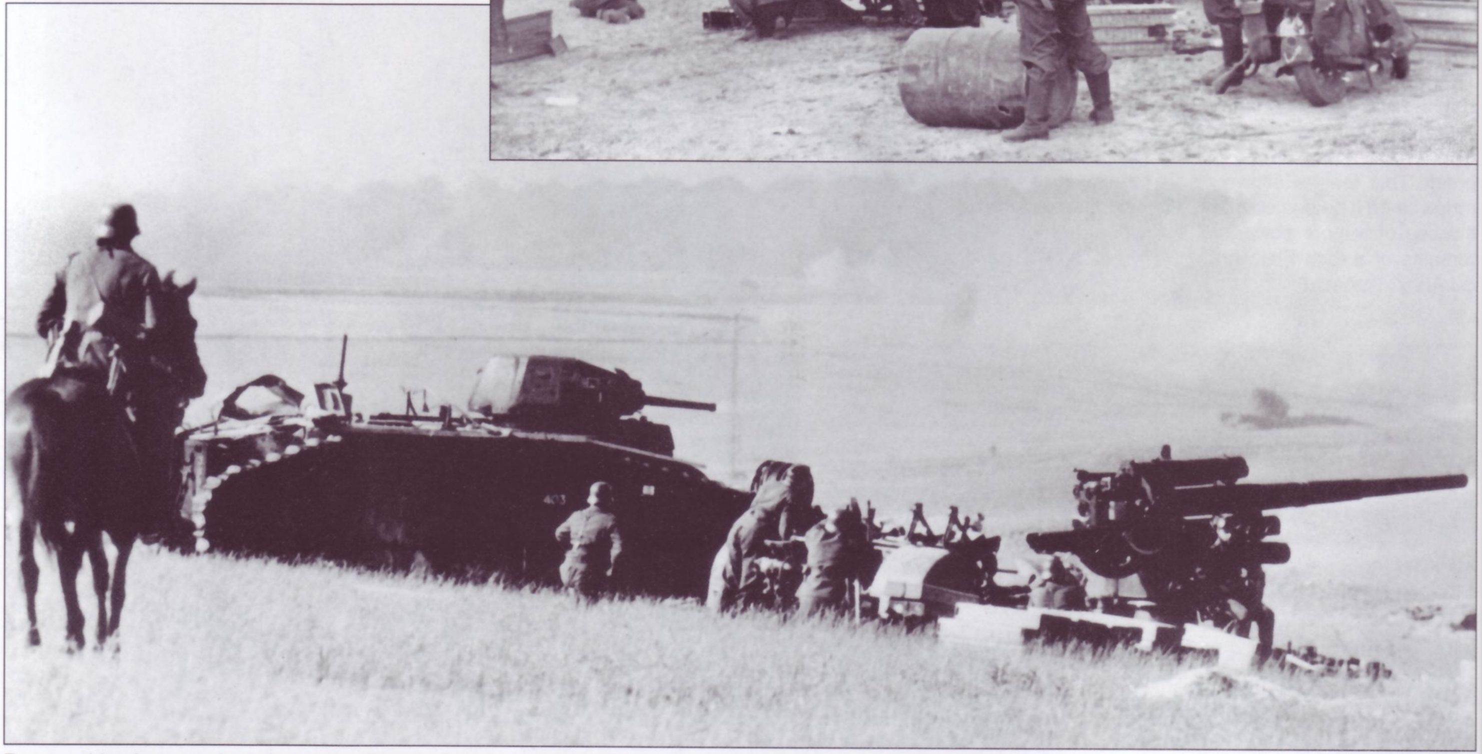
Gun "D-for Dora", an 8.8cm FlaK18 or 36 is firing at high angle against an aerial target. The tripod-mounted device in the foreground is a long-range spotting telescope.



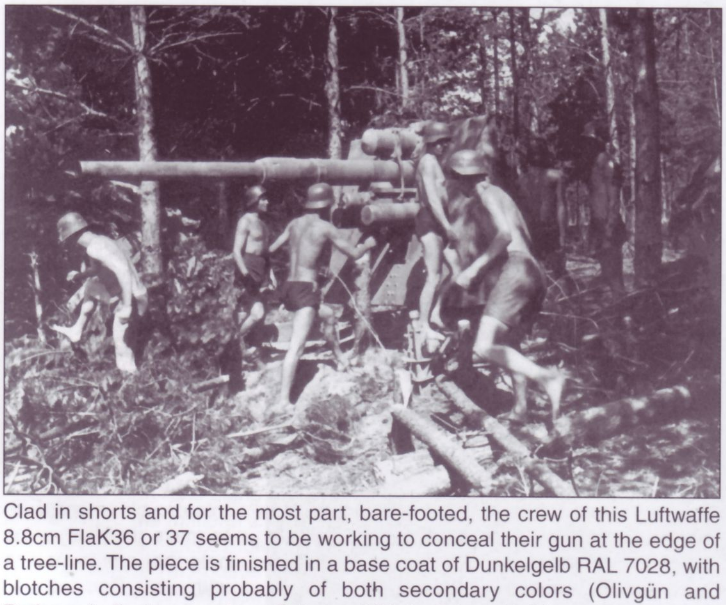
In a scene that would be typical in the early years of the war, an 8.8cm FlaK18 is being pushed by its crew towards its tractor, an early mittlerer Zugkraftwagen 8-ton Sd.Kfz.7 with KMm9 body style. Note the configuration of the rear bodywork on the tractor as well as the standard stowage of a pair of spare tires; this was not a feature of the more-often-seen Sd.Kfz.7 with KMm11 body style. In the foreground, a group of "Kradschützen" (motorcycle troops) tries to make their way past; note that one is marked with a Red Cross medical insignia on the side-car.

The Luftwaffe crew of this 8.8cm FlaK18 stand ready to engage ground targets; note the four "kill rings" on the gun tube, an indicator of earlier success in that role. Plainly visible on the Sd.Ah.201 limber unit at left-center, is the hand crank used to raise and lower the Kreuzlafette 18 gun mount. Also visible are several wicker three-round ammunition containers, a liaison motorcycle, and at far left, the rear end of the tractor, an Sd.Kfz.7.

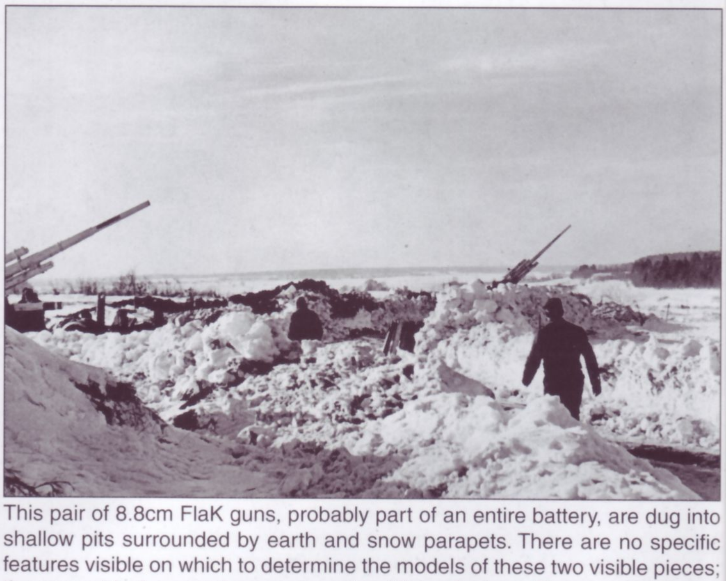




Presumably photographed during the French Campaign of 1940, this 8.8cm FlaK18 uses a destroyed French Char B1 bis heavy tank as cover. The gun is identified as a FlaK18 by the Sd.Ah.201 limber units; it has no Schutzschild (splinter shields) and mounts the mono-block gun tube.

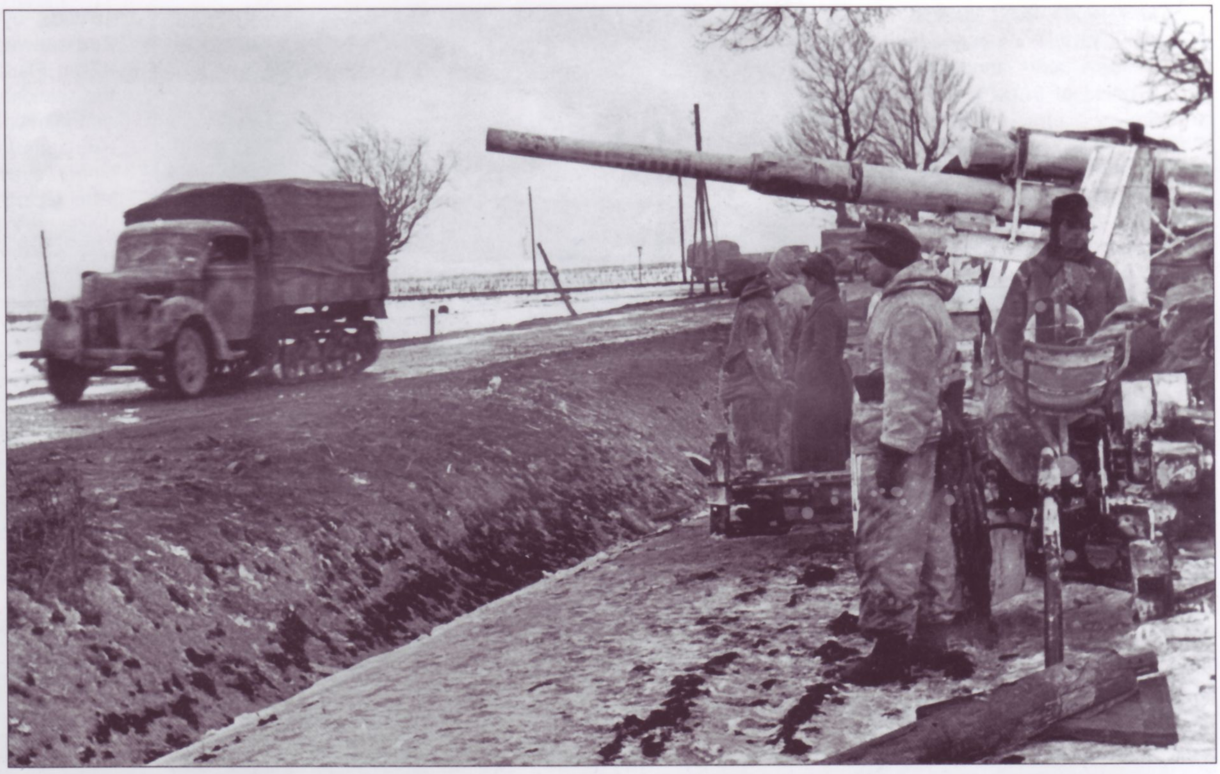


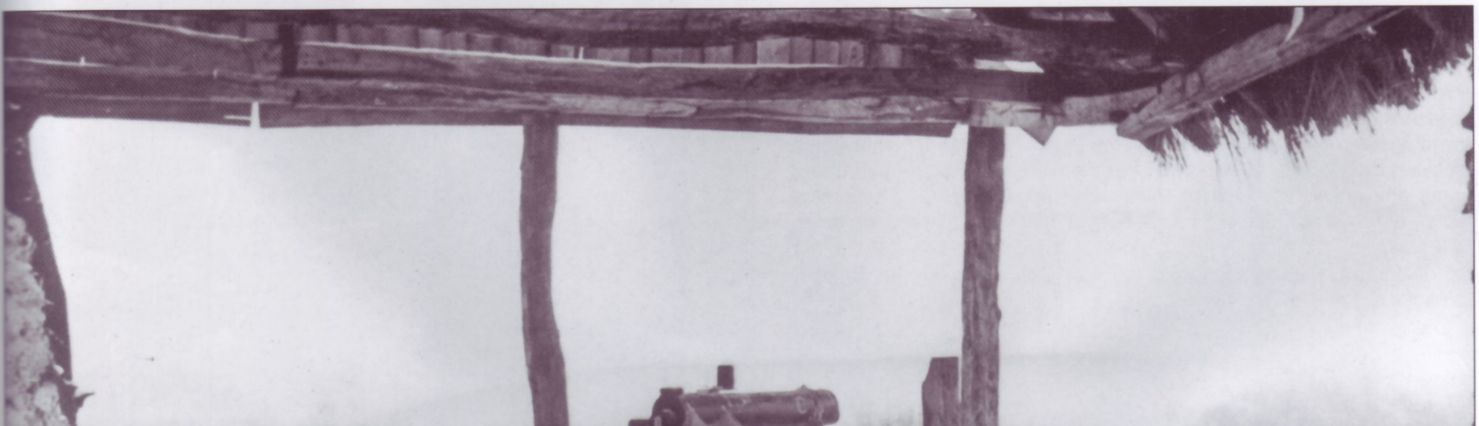
Clad in shorts and for the most part, bare-footed, the crew of this Luftwaffe 8.8cm FlaK36 or 37 seems to be working to conceal their gun at the edge of a tree-line. The piece is finished in a base coat of Dunkelgelb RAL 7028, with blotches consisting probably of both secondary colors (Olivgün and Rotbraun). It also sports a Schutzschild (splinter shield) and mounts the sectional gun tube.



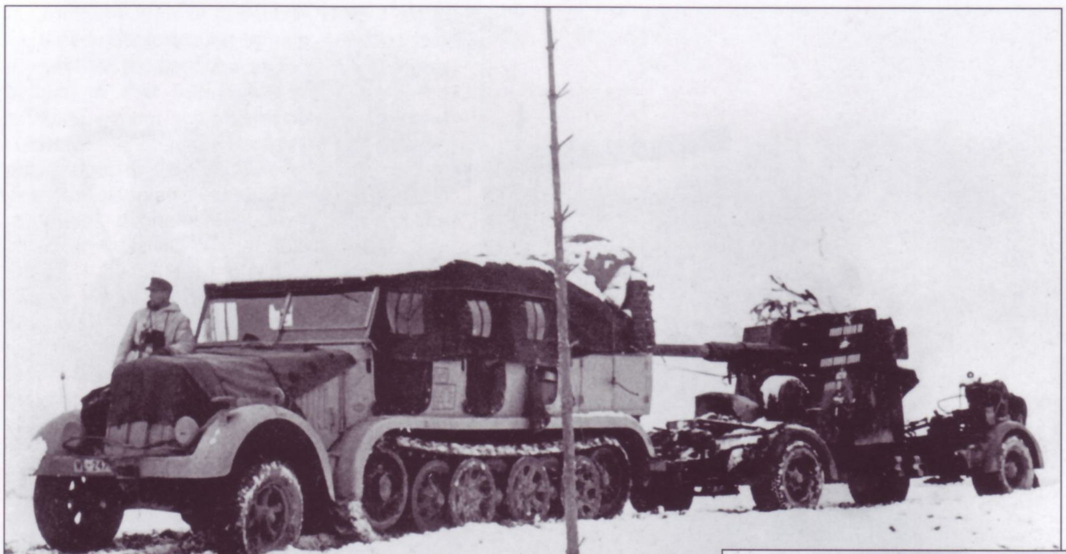
This pair of 8.8cm FlaK guns, probably part of an entire battery, are dug into shallow pits surrounded by earth and snow parapets. There are no specific features visible on which to determine the models of these two visible pieces; the mono-block gun tube is not an identifying feature. The gun at left has been white-washed for camouflage against the snow, but it has part of the gun tube in the original color, possibly to preserve a score-board.

A Ford V3000S (Sd.Kfz.3) Maultier (Mule) moves along a road under the watchful eye of an 8.8cm FlaK36 or 37 gun; the position of the earth anchors at the tips of the Kreuzlafette 36 legs identifies the type. The piece has the Schutzschild (splinter shields) in place and mounts the sectional gun tube. Note how the white-wash has obscured the "kill rings" on the front section of the gun tube.

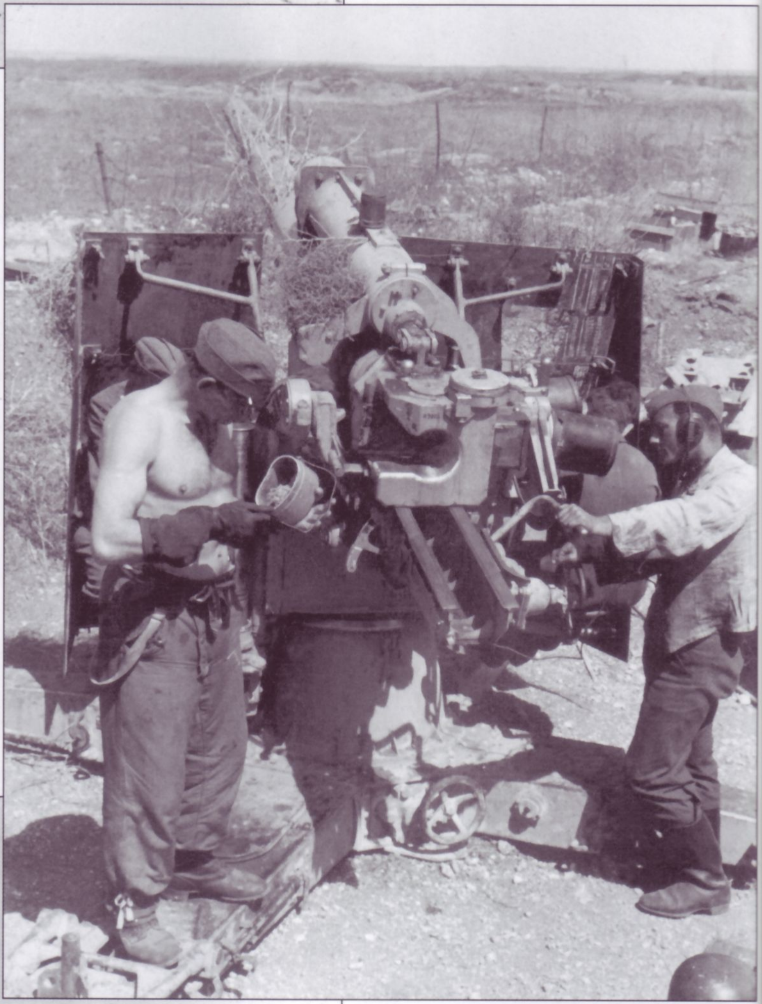




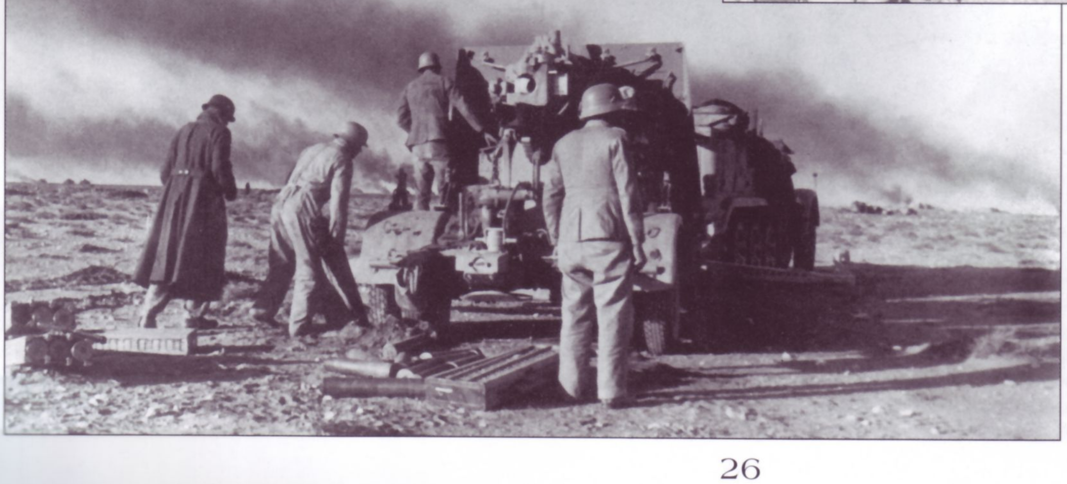
The crew of this 8.8cm FlaK18 (note the Sd.Ah.201 limber section at right) has emplaced their piece inside a partially destroyed structure. Note how the wall has been opened to provide a field of fire and the upright logs that support the roof. The crew seems to be engaging a ground target as can be determined by the elevation of the mono-block gun tube and the position of the loader, who waits with a fresh round. Note also the stack of wicker three-round ammunition containers with ready rounds on top.



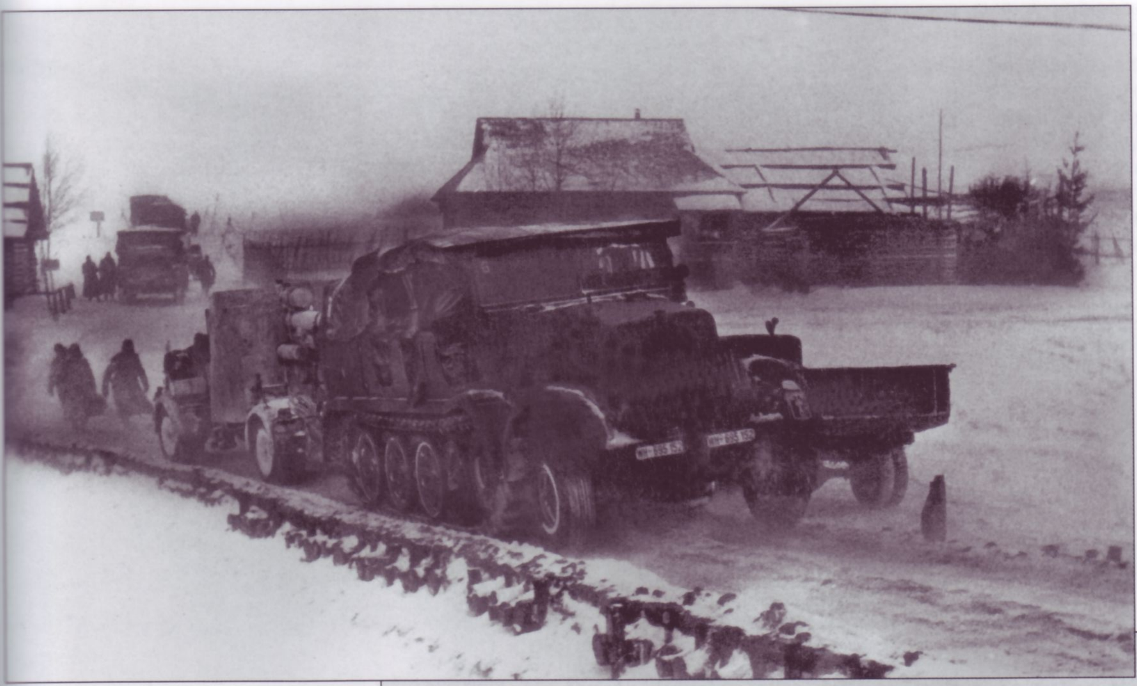
Towed by a Luftwaffe mittlerer Zugkraftwagen 8-ton Sd.Kfz.7, this 8.8cm FlaK36 or 37 is unusual in that the sectional gun tube is facing forward during travel. FlaK guns mounted on the Kreuzlafette 36 with the Sd.Ah.202 limber system normally had the gun tube facing towards the rear, held in place by the travel lock. This piece is also unusual in that the gun tube is not resting on any sort of travel lock; this may indicate a hasty or short-distance movement. The Schutzschild (splinter shield) has quite a score-board painted on the face, over the original Dunkelgrau RAL 7021 base color. The tractor is finished in Dunkelgelb RAL 7028; note the railroad shipping label stenciled on the side of the body-work, just aft of the driver's station.



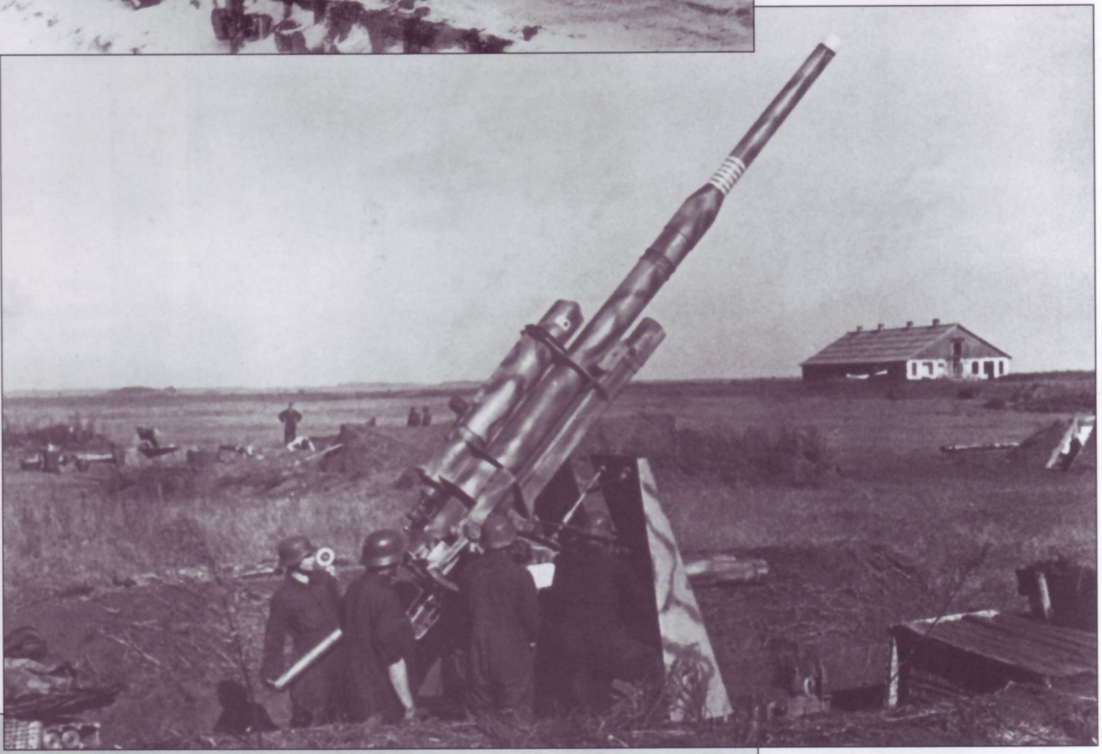
The crewmen of this 8.8cm FlaK18 seem to be ready for anything the enemy can throw at them. Note the position of the earth anchor on the Kreuzlafette 18, which is an identifying feature of this type. The man with the radio head-set is having a look at the Lampenempfänger (light signal receiver) dials, which have hoods over them so they can be read under bright ambient light conditions. Note what appears to be a complete round resting in the fuse setter, just behind the man with the open mess kit. In addition, the piece is finished overall in Dunkelgelb RAL 7028, but the inside of the Schutzschild (splinter shield) is in the original Dunkelgrau RAL 7021.



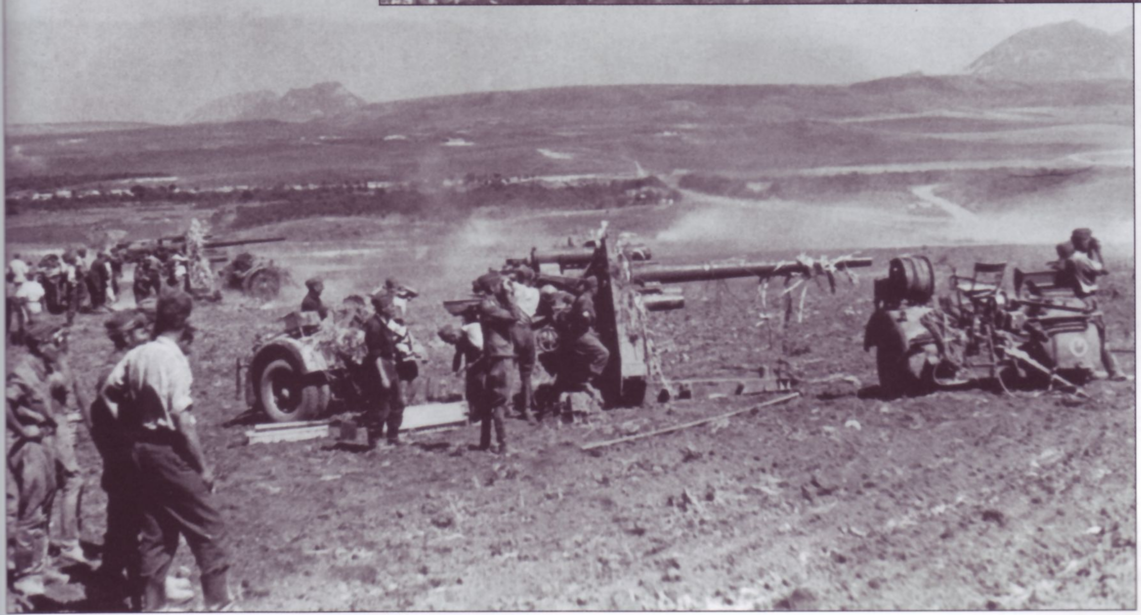
The crew of this 8.8cm FlaK18 seem to be preparing their piece to travel after "doing some work" in the North African desert. Note the wicker three-round ammunition containers strewn about and the orientation of the gun tube towards the direction of the tractor's travel. The out-rigger arms for the Kreuzlafette 18 are still extended; this would help steady the piece if, in an emergency, it had to be fired while still on the Sd.Ah.201 limbers. But, in that case, the traverse would be extremely limited. This was somewhat alleviated with the later Sd.Ah.202 limber system on the Kreuzlafette 36.



Making its way through absolutely horrid weather conditions, this Heer (Army) 8.8cm FlaK18 is being hauled behind its mittlerer Zugkraftwagen 8-ton Sd.Kfz.7. The tractor exhibits the "Stalhelm" insignia of the Großdeutschland (Greater Germany) Division on its Dunkelgrau RAL 7021 paint finish; below that is the tactical sign for a motorized anti-aircraft unit. The piece is identified as a FlaK18 by the Sd.Ah.201 limber system and the forward orientation of the gun tube while in travel mode.

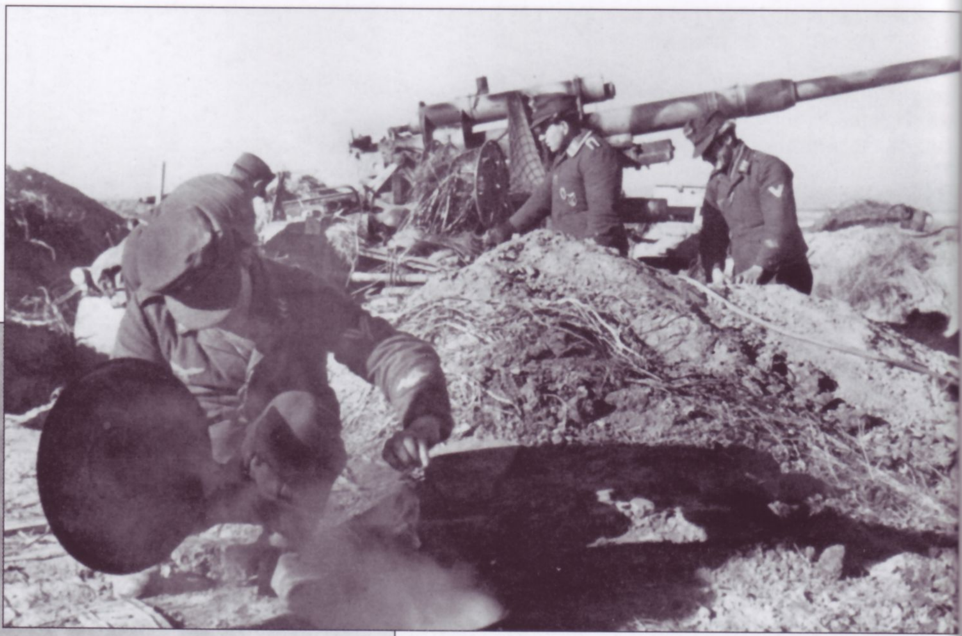


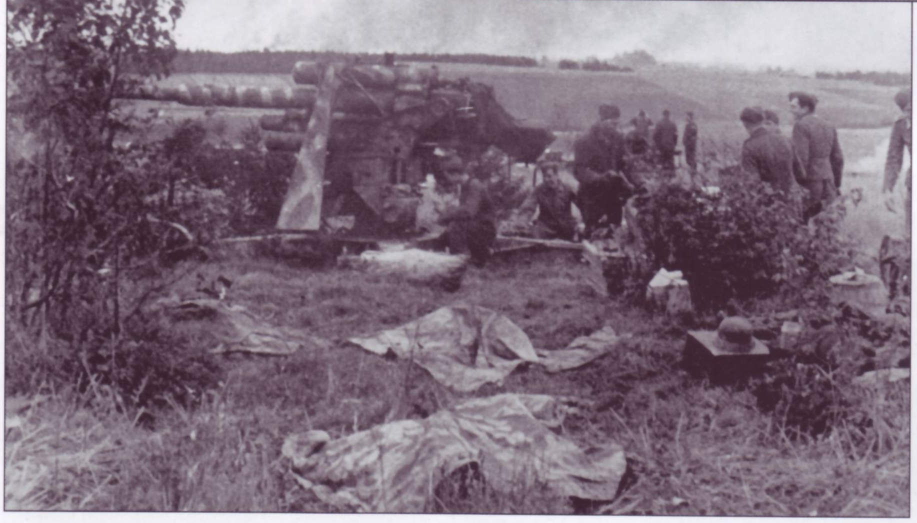
The crew of this 8.8cm FlaK37 is in the act of engaging an aerial target as can be surmised by the elevation of the sectional gun tube. The piece is identified as a Flak37 by the just-visible Folgezeigeempfänger (directional indicator with dials), which can be seen between the two men at the right. Note how the gun is dug in with the rest of the battery so they can fire a coordinated aerial barrage. This gun is finished in a base color of Dunkelgelb RAL 7028. To this was added a wavy, striped camouflage pattern of Olivegrün RAL 6003 and Rotbraun 8017 on the entire piece. The sectional gun tube features six "kill" rings in white, while the gun-in-battery letter, "B", is seen (also in white) on the forward section of the recuperator cylinder.



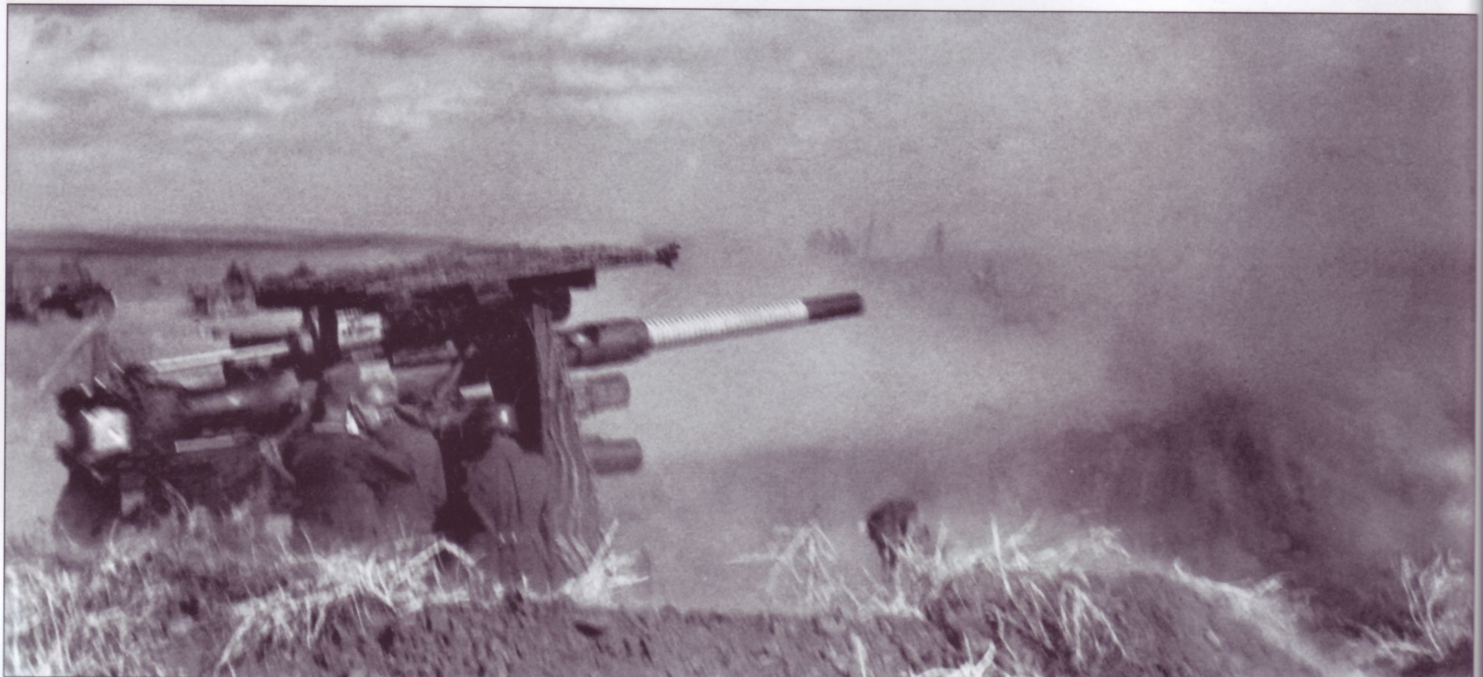
A pair of "eighty-eights", the nearest of which is identified as a FlaK36 by the covered Lampenempfänger (light signal receiver) dials, engages ground targets; the casual appearance of the bystanders suggests that this may be a training shoot. Note that although the guns are positioned on open ground, some attempt has still been made to disguise their outlines with vegetation secured to the gun tubes and splinter shields.

While a man in the foreground prepares a hot meal, the crew of this Luftwaffe 8.8cm FlaK gun performs house-keeping chores around their emplaced piece. There are no easily recognizable parts visible in this photograph to confirm what model this is, but it is believed to be a FlaK36. Note the neatly-applied camouflage paint which is based on Dunkelgelb RAL 7028. To this was added a wavy, pattern of Olivegrün RAL 6003 and Rotbraun RAL 8017. This piece also mounts the sectional gun tube and a Schutzschild (splinter shields).

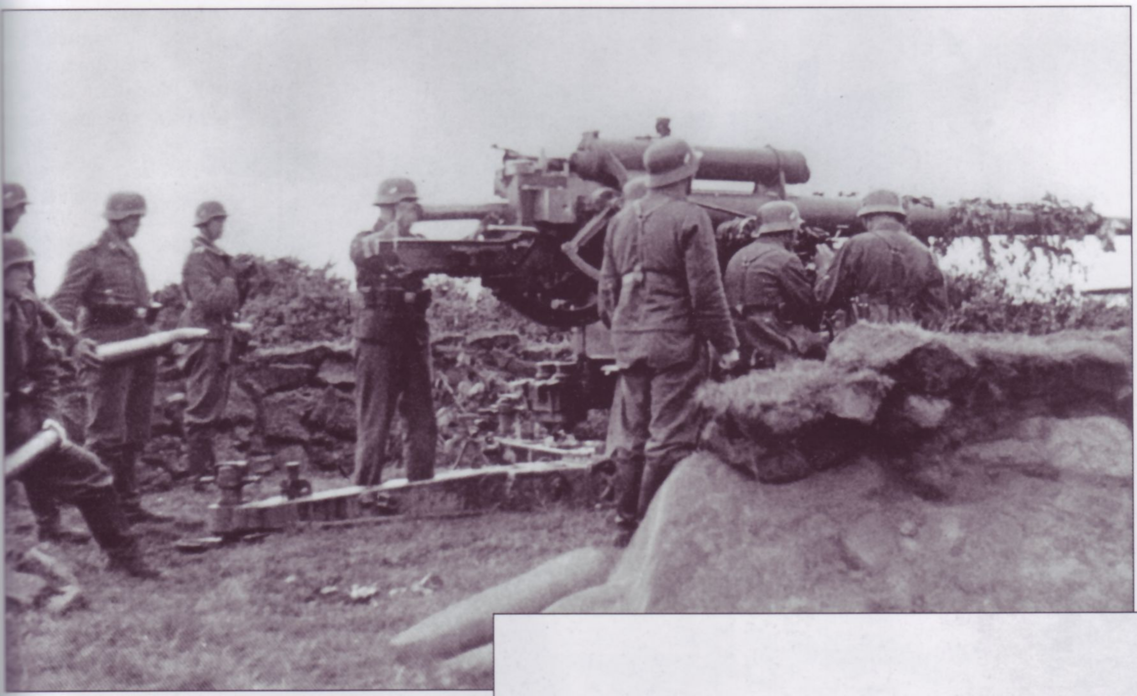




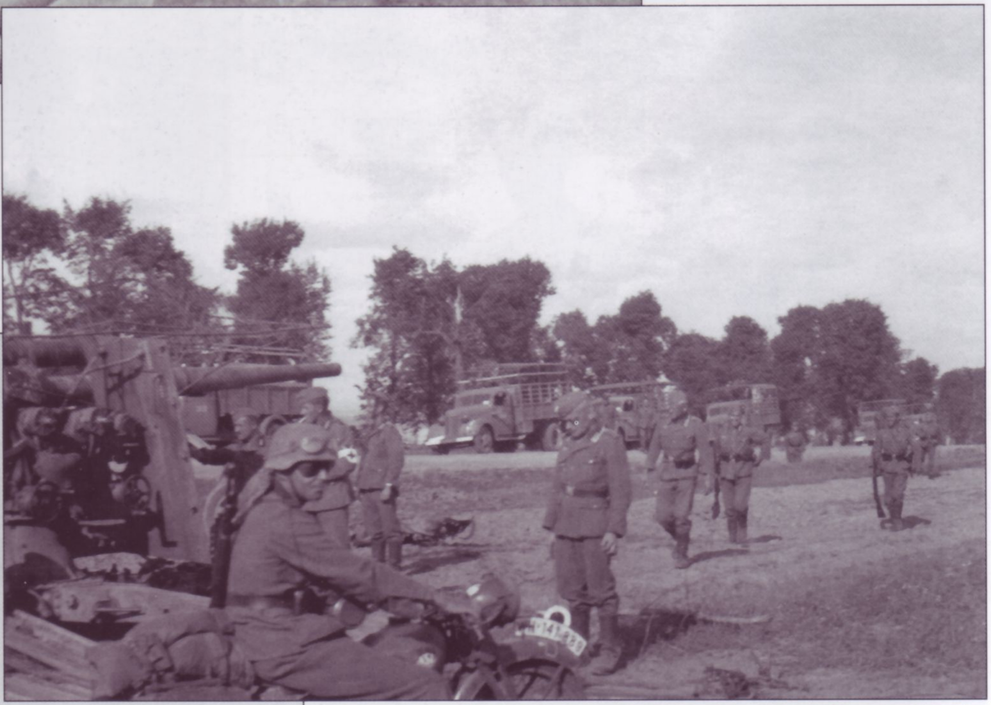
The crew of what is probably an 8.8cm FlaK36 rests between combat. Note the large amount of accessories scattered about on the earth and the relatively well-concealed position of the gun. It mounts a sectional gun tube and Schutzschild (splinter shields), and has the breech loosely covered for protection against the elements. This piece is camouflaged with a base color of Dunkelgelb RAL 7028. To this was added a wavy, striped camouflage pattern of Olivegrün RAL 6003 and Rotbraun RAL 8017.



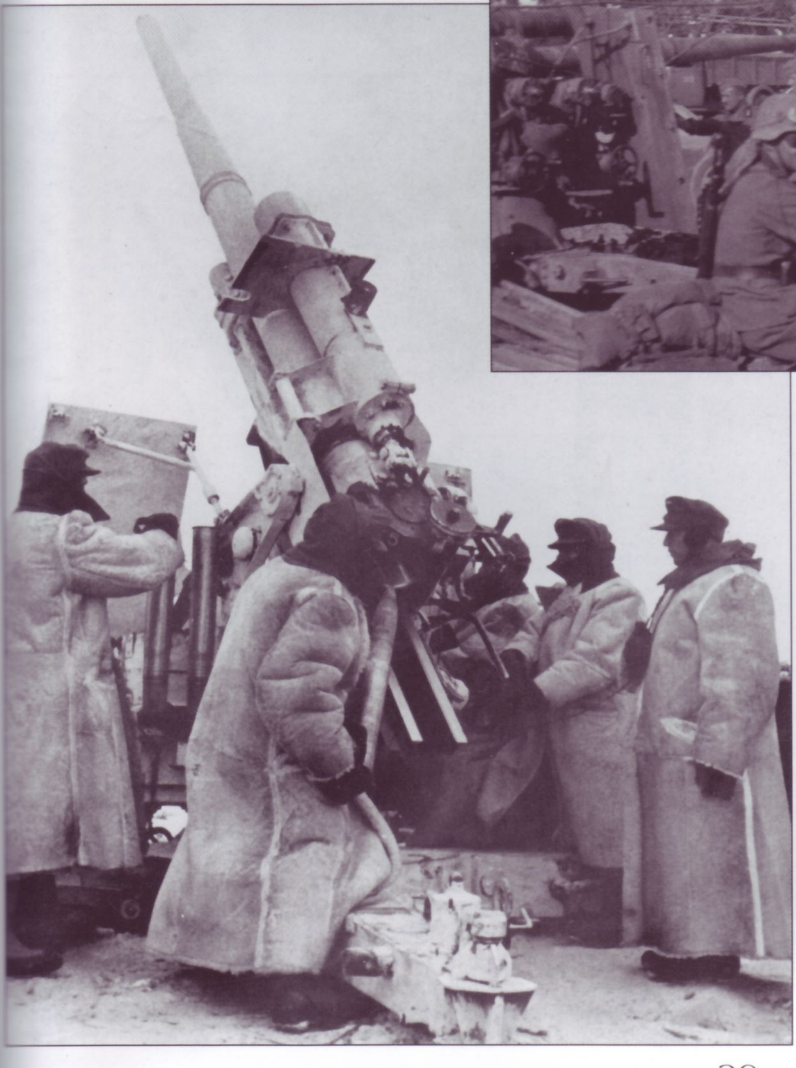
"Feur"! This 8.8cm FlaK has been caught in full recoil as it sends a round downrange against a ground target. Note the extensive amount of "kill rings" on the sectional gun tube as well as the fine, wavy lines of camouflage paint on the Schutzschild (splinter shields). Although smokeless powder was used by Germany, a considerable amount of dust and earth has been kicked up by the concussion produced by the gun's report. This served to obscure observation of the "fall of shot" against the target, delaying any following shots. This phenomenon also could alert a watchful enemy to the gun's location, inviting counter-battery fires.



Another group of Luftwaffe gunners serve their dug-in 8.8cm FlaK18. Note the round dials of the Lampenempfänger (light signal receiver) seen between the second and third men from the right; this was a feature of both the FlaK18 and the FlaK36. The Kreuzlafette 18, with the earth anchor positioned further in from the leg's tip, helps identify this gun.

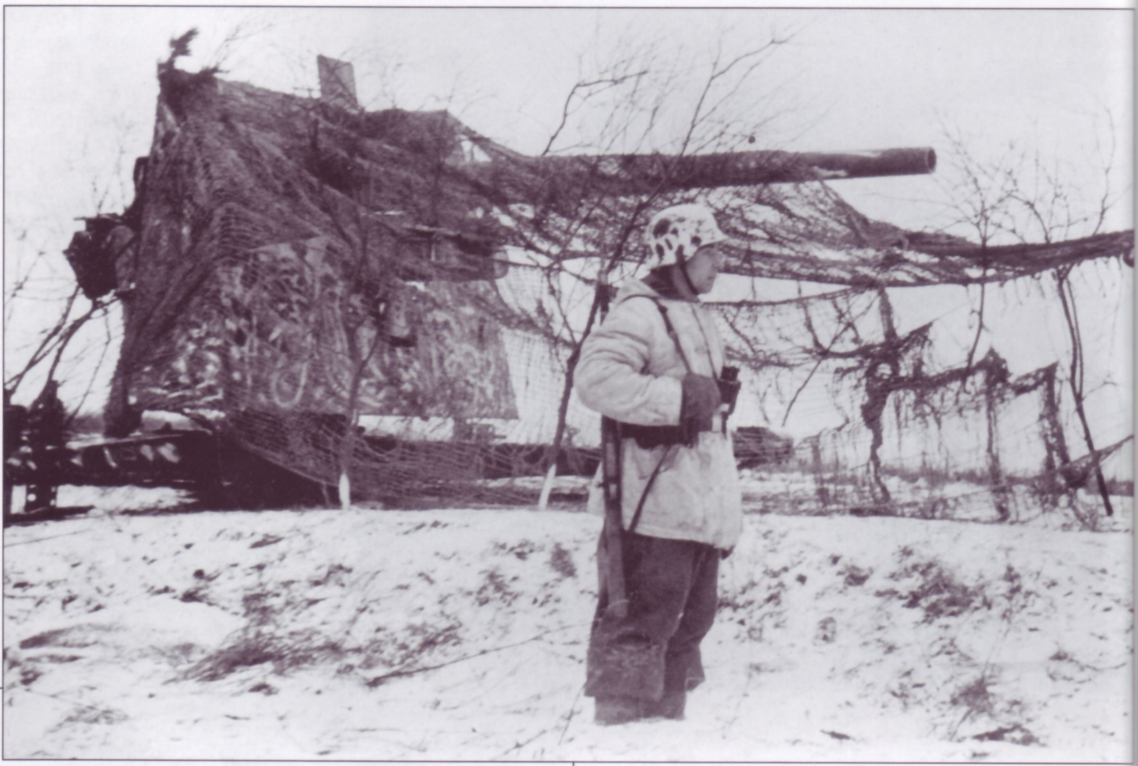


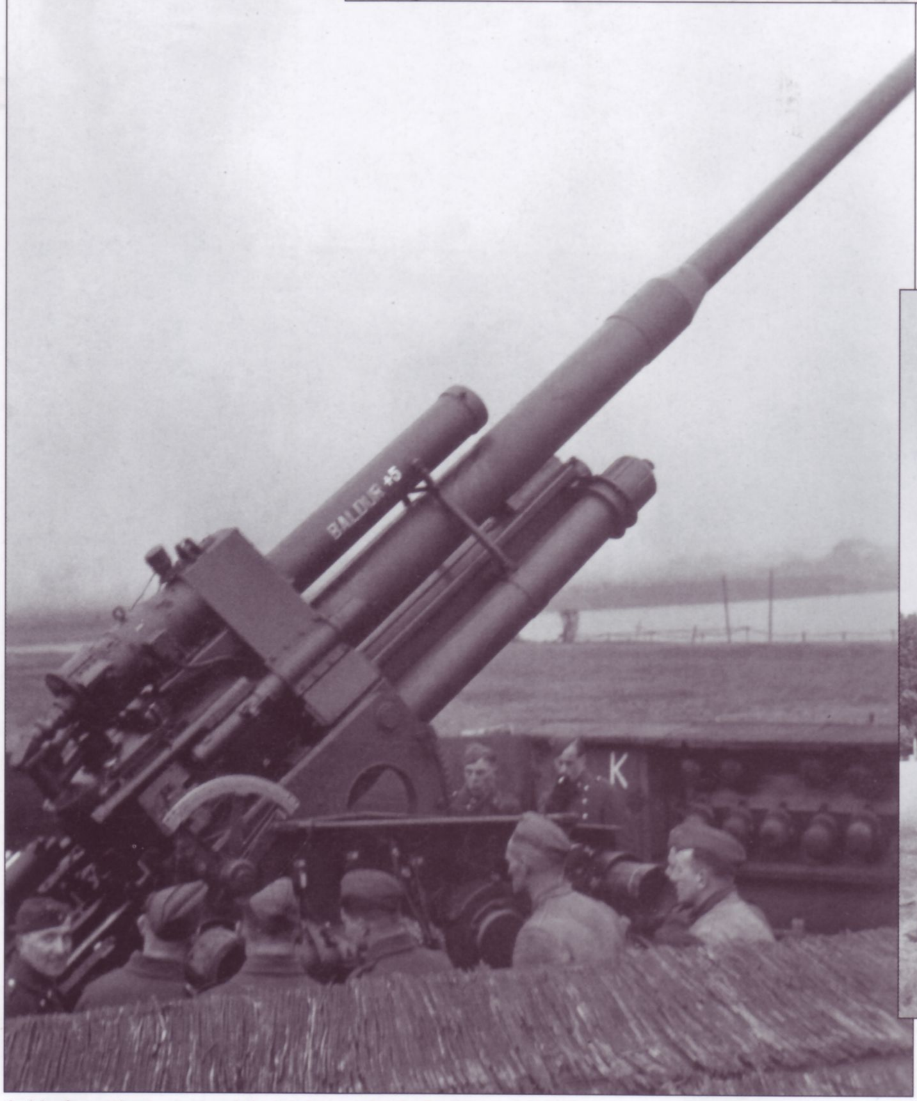
This 8.8cm FlaK18 or 36 guards a road while a column of trucks passes by. Note the round dials of the Lampenempfänger (light signal receiver) which identifies the type. The Schutzschild (splinter shields) lacks the triangular side extensions, but it does mount a framework above it in order to place camouflage materials.



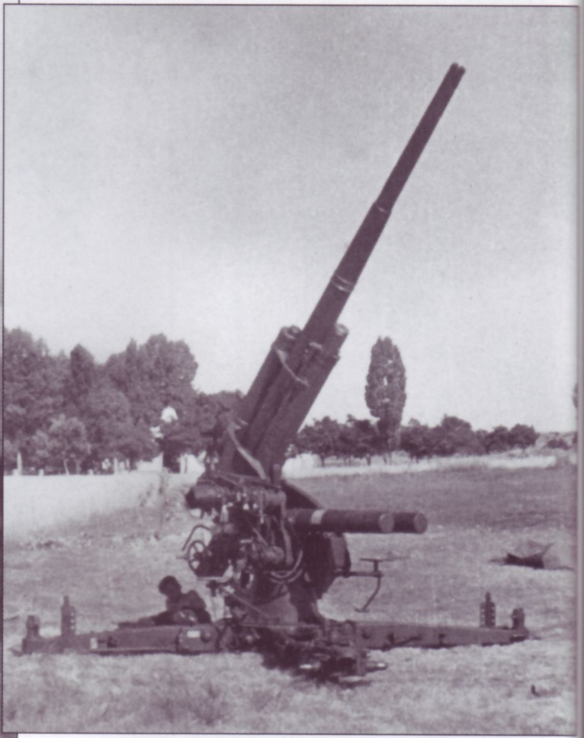
Well protected against the frigid winter temperatures, the crew of this 8.8cm FlaK36 or 37 engages aerial targets. Note the two rounds already placed in the Zünderstellmaschine (fuse setting device), with the loader about to place another in the breech. Aside from the common Schutzschild (splinter shields), this gun also features a smaller shield section on the recuperator cylinder.

Although this 8.8cm FlaK18 gun (note the position of the earth anchor on the cruciform mount at far left) is emplaced on open, snow-covered ground, the crew has taken some steps to disguise their piece by distorting its outline. To accomplish this, they have stretched some netting from the Schutzschild (splinter shields) to some small saplings in the immediate area. The shields themselves have been given a rudimentary winter camouflage consisting of rough lines and squiggles; note also the small auxiliary shield fitted over the recuperator cylinder.



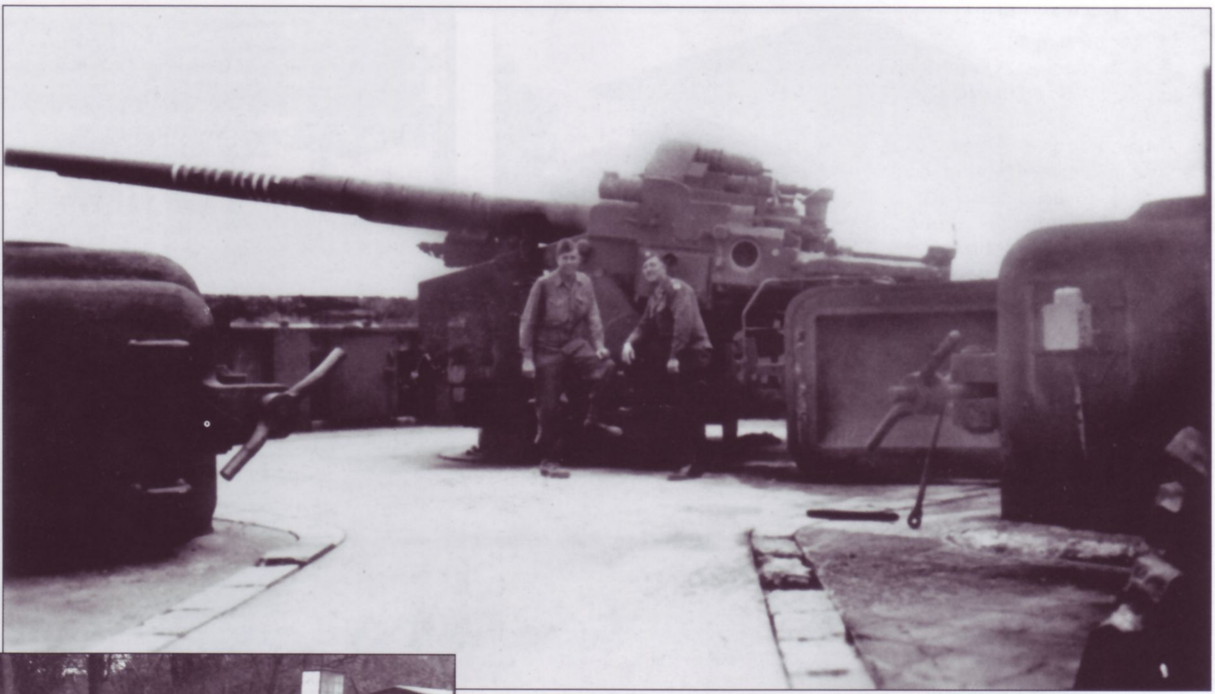


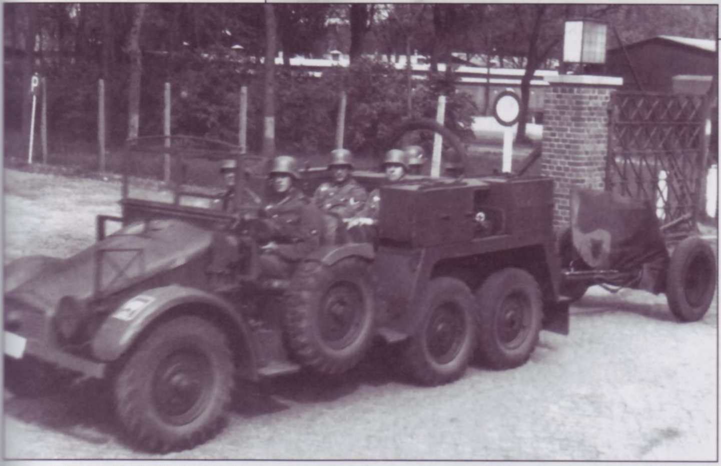
Aside from the more mobile 'eighty-eights", Germany fielded heavier mobile FlaK guns; pictured here is "Baldur", a 10.5cm FlaK38/39. Although also designed to accompany field units, many of these guns were retained in the Reich proper for defense against the ever-increasing ferocity of Allied air raids. This piece is fully-emplaced and has some creature comforts for the crew, to include various storage cubicles lining the gun pit's walls; note the men's helmets at right.



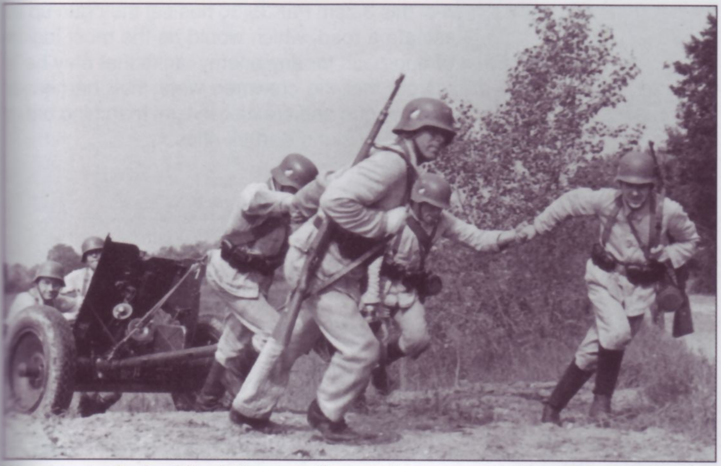
This very clean 8.8cm FlaK18 sits out in the open, while a lone crewman uses the shade created by the piece to escape from the sun. There appear to be several data plates on the gun, including two on the Kreuzlafette 18 leg (at left) and possibly another on the counter-balance spring housings under the gun tube. Note also the location of the earth anchors on the platform legs, a characteristic of the type.

Perhaps the most formidable German anti-aircraft gun of the era, the 12.8cm FlaK40 was seen on various urban "Flak Towers", beginning in Berlin in the spring of 1942. This is a twin mount, designated "Flakzwilling 40", which combined two gun tubes under the direction of a single crew. Note the kill rings on the near gun tube and the massive concrete and steel ammunition vaults in the left and right foreground; of particular interest are the locking handles for the vault doors.

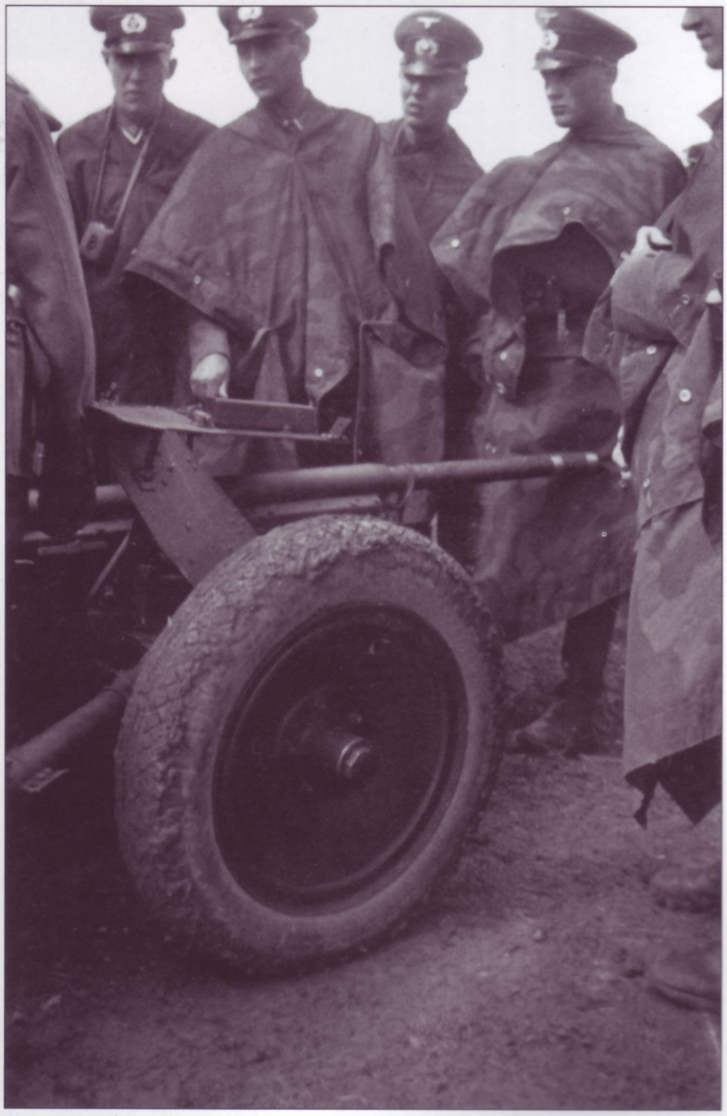




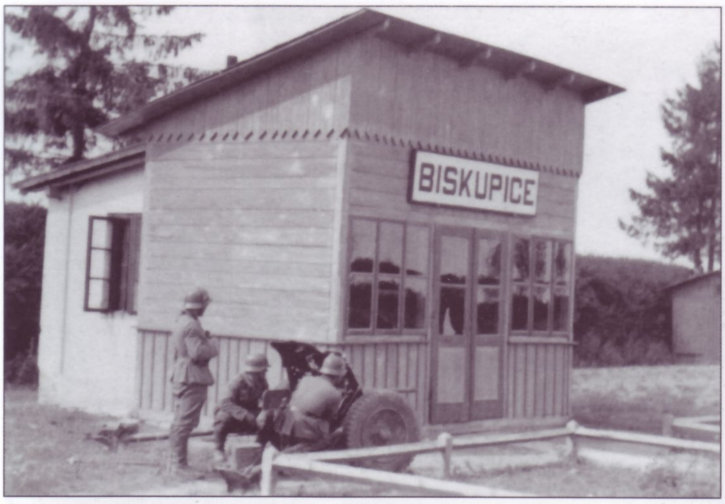
This 3.7cm PaK35/36 is being hauled by a wheeled Krupp L2H143 (Kfz.69) tractor as it departs its barracks for field exercises. Note the cover on the PaK, which is finished in the pre-war "feuersicherem Buntfarbenanstrich" camouflage scheme, while the tractor (and the gun itself) appears to have been re-painted in the two-tone scheme of Dunkelgrau Nr.46 and Dunkelbraun Nr.45, which was introduced in June 1937. There is also a tactical marking on the near fender of the tractor, just below the pennant frame.



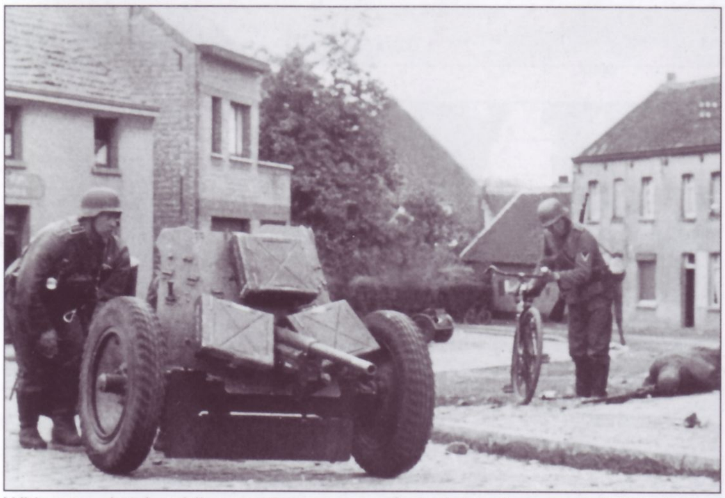
Wearing typical white fatigue uniforms, the crew of this 3.7cm PaK35/36 struggles to man-handle their gun up an incline. Note how the work has been divided; two men are pushing from the rear, two men are pulling using the standard-issue, purpose-designed straps (note that the near one is attached next to the wheel) as they each grasp a trail leg with one hand, while the two men up front assist by pulling the two center men by the hand.



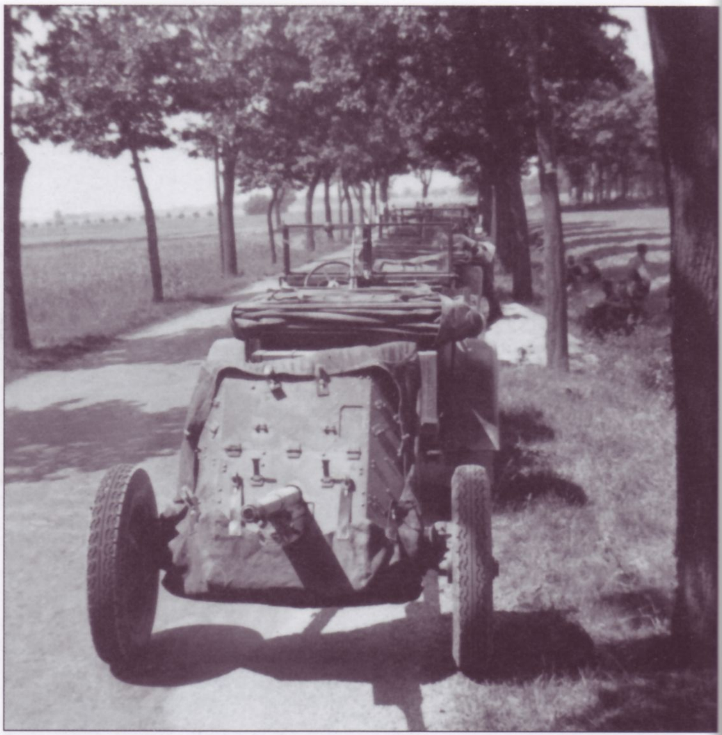
A group of youthful NCOs or officer candidates (note the thick, white "Waffenfarbe" of the two men at left) examines a 3.7cm PaK35/36. They all wear their Zeltbahn shelter quarters as rain capes, and are also topped off with the M1935 peaked cap. The gun has its upper shields folded down (note the "rest" under the near segment) so the men can better see what their instructor is talking about.



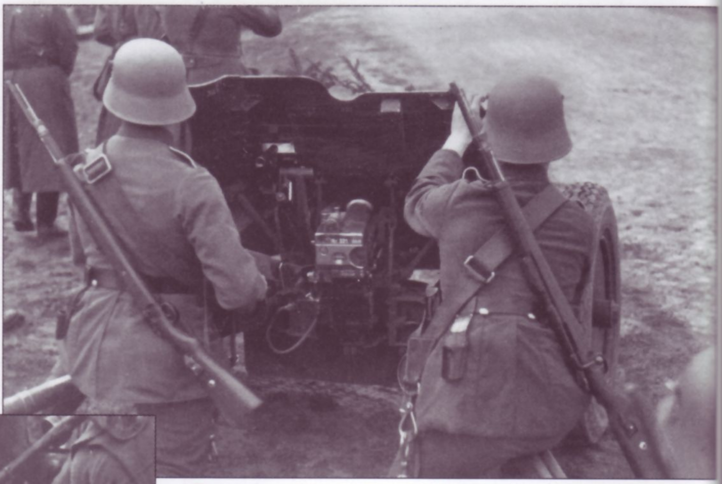
Obviously photographed in Poland (possibly at a rural train station), the crew of this 3.7cm PaK35/36 readies their piece for action. The serenity of the scene suggests that this photograph was taken after the 1939 campaign, and that the gun and its crew are on field exercises.



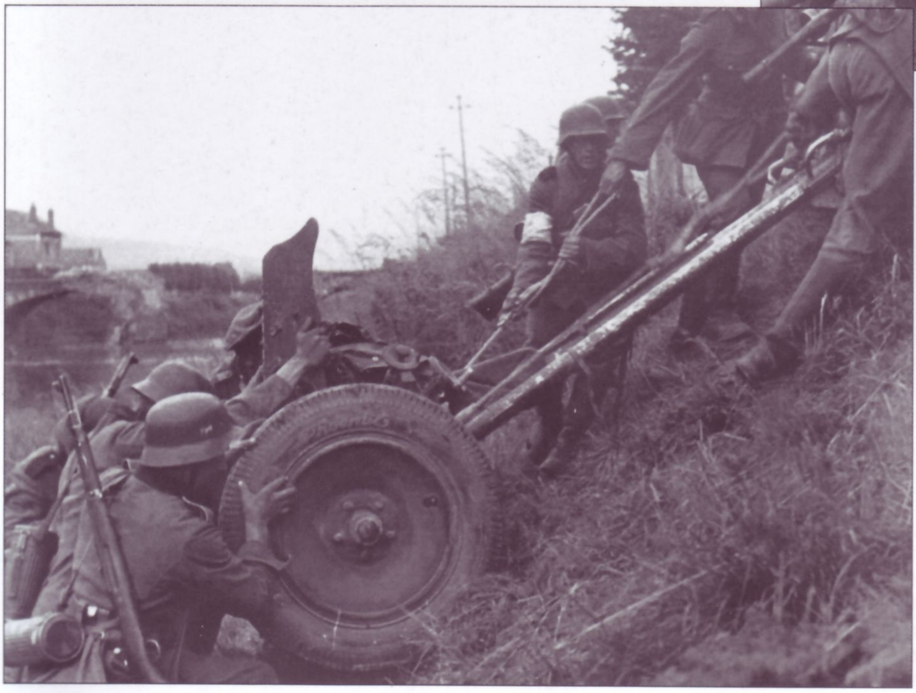
With one dead soldier on the pavement at right, the crew of this 3.7cm PaK35/36 cautiously pushes their gun forward. Note the typical stowage of ammunition boxes on the gun's shields and the anxious face of the man at left. German anti-tank tactics dictated the forward placement of their guns as well as their aggressive, offensive use; the gun's tractor stays back behind the cover of a building, ready for instant call-up.



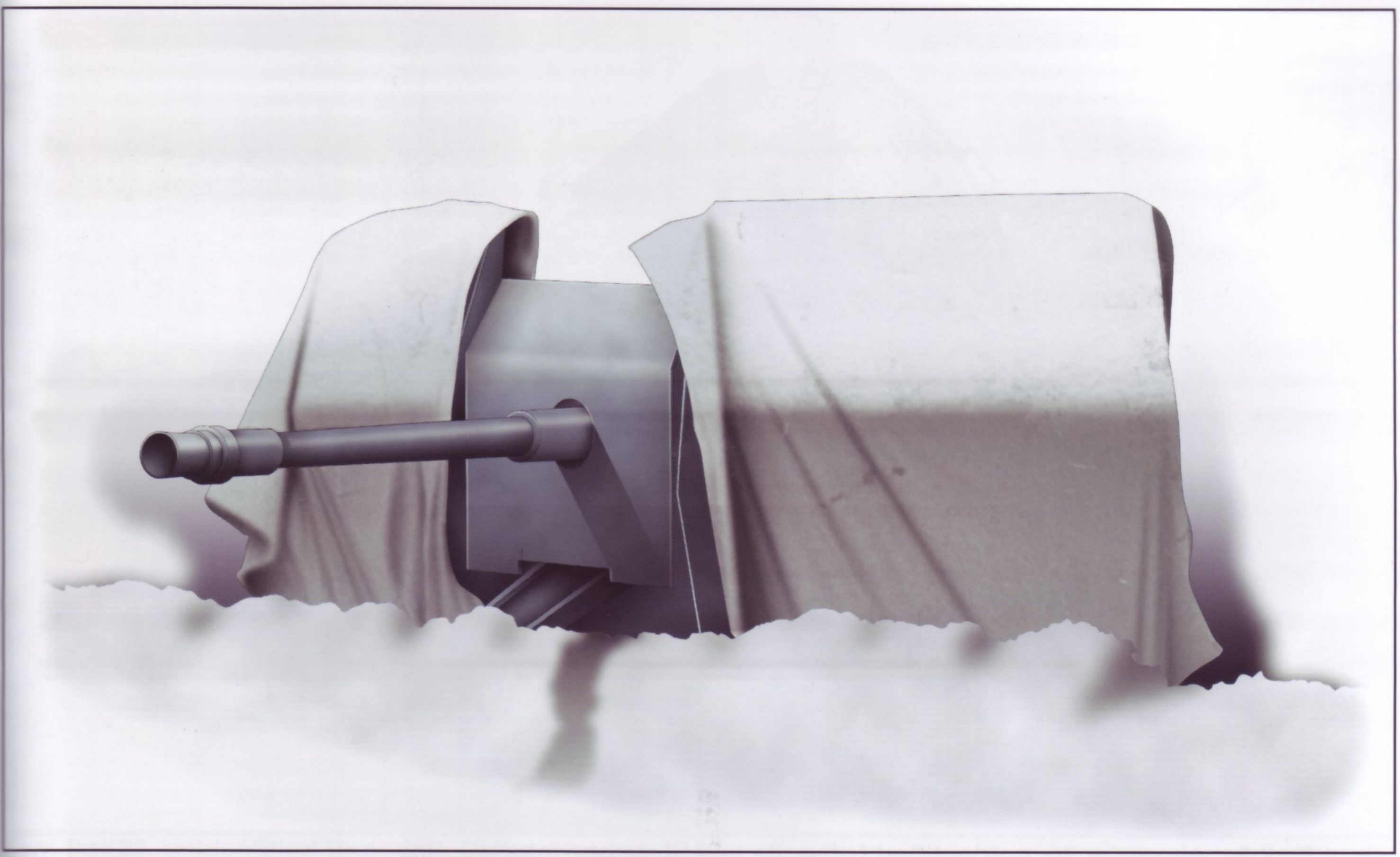
Still hitched behind their tractors, a battery of 3.7cm PaK35/36s takes cover on a road-side, beneath the shadow of trees. Note the configuration of the canvas dust cover for the gun's breech and how it wraps itself around the front of the shield.



The crew of this 3.7cm PaK35/36 has set their gun up so as to dominate a road, which would be the most logical avenue of approach for any enemy tanks that may be in the area. Note that the crewmen wear their harnesses for dragging the gun and are also in light marching order, carrying only their slung Kar98k rifles.

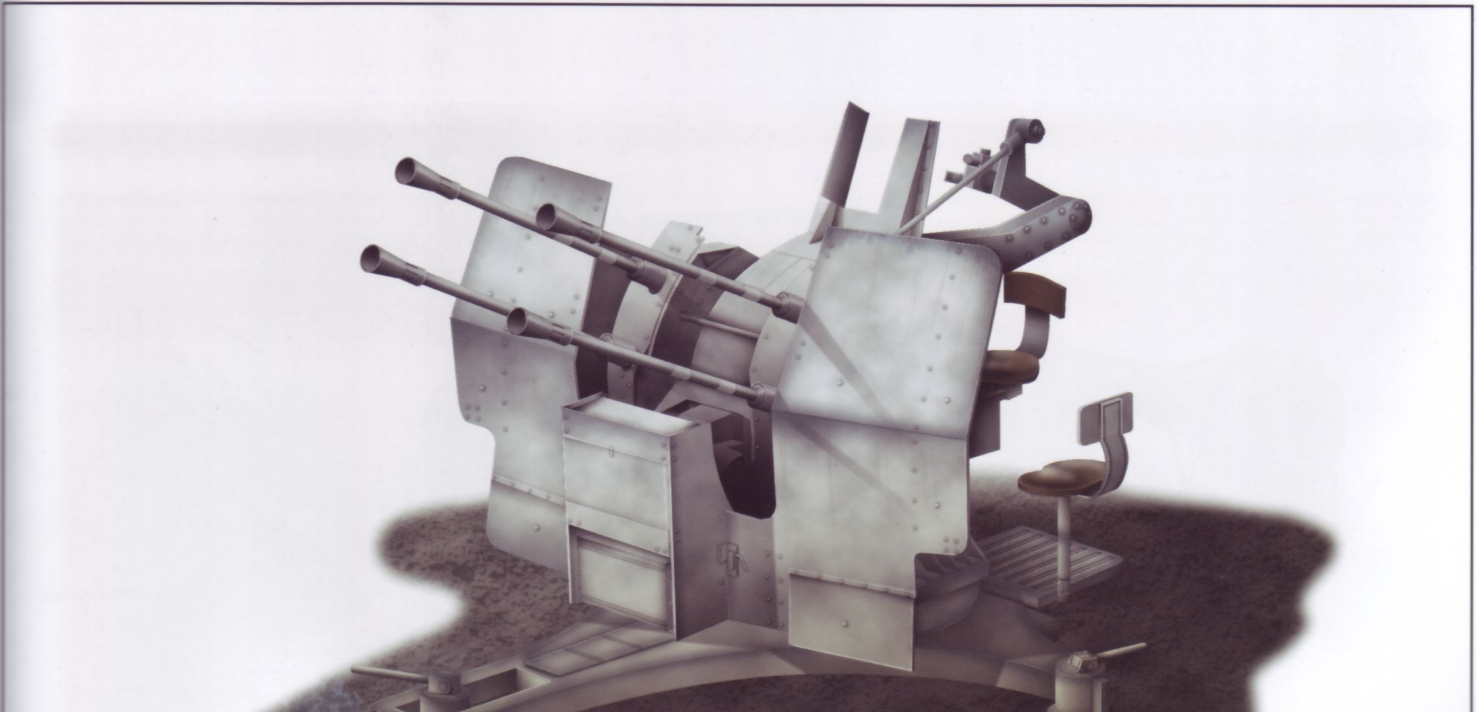


A group of soldiers struggle to drag this 3.7cm PaK35/36 up the steep sides of a riverbank, a grueling chore that has been created as a result of the destroyed bridge in the background of the photo. Note the leather strap being used by two men and that even their officer (his peaked cap can be seen on the far side of the gun) is pitching in to help.



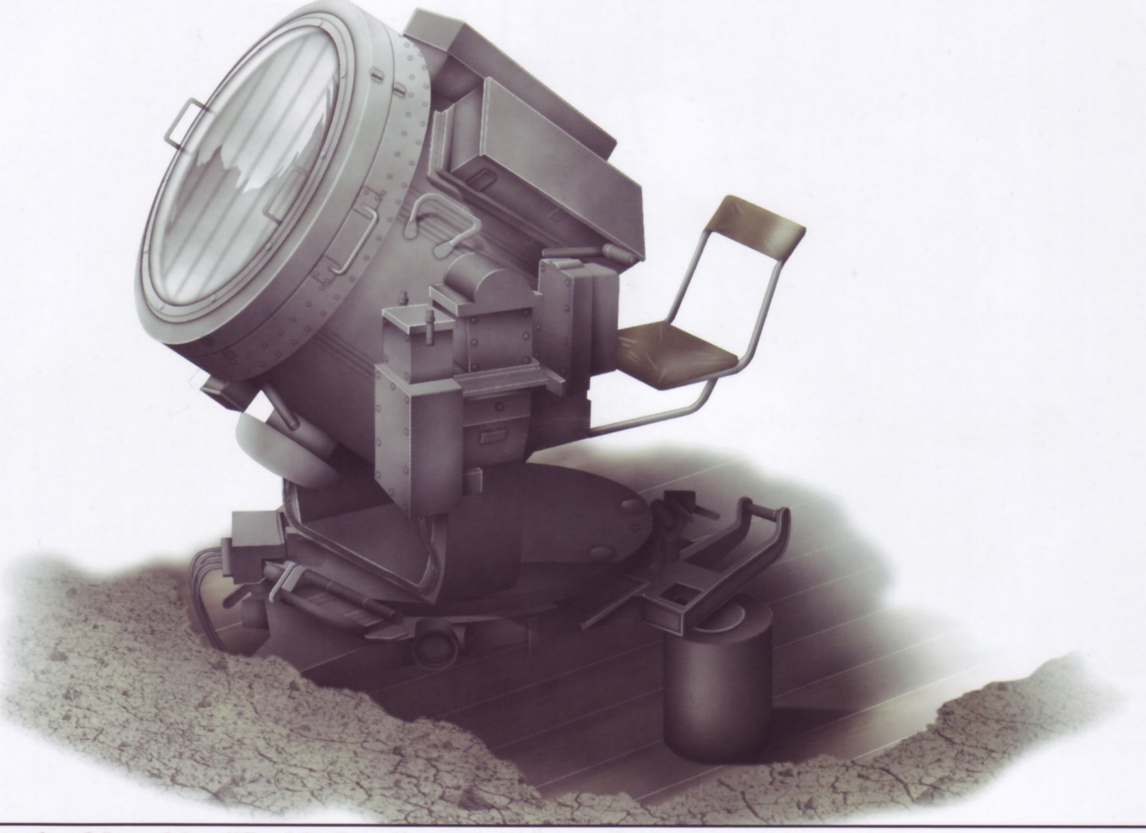
2cm FlaK30, unidentified unit, Ostfront winter 1941-42

This piece is finished overall in factory-applied Dunkelgrau RAL 7021; for extra concealment in the winter snows, it has been partially covered with white cloth, which itself has been coated with freshly-fallen snow.

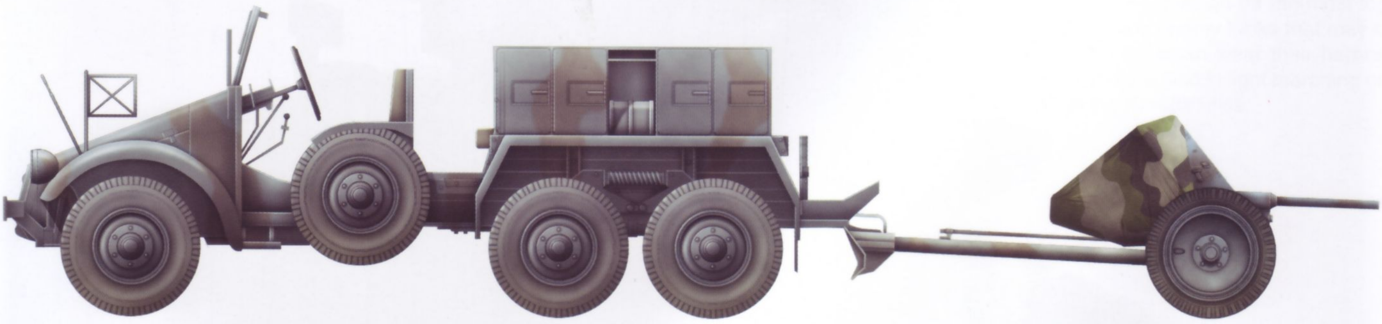


2cm Flakvierling 38, unidentified unit, Ostfront, spring 1942

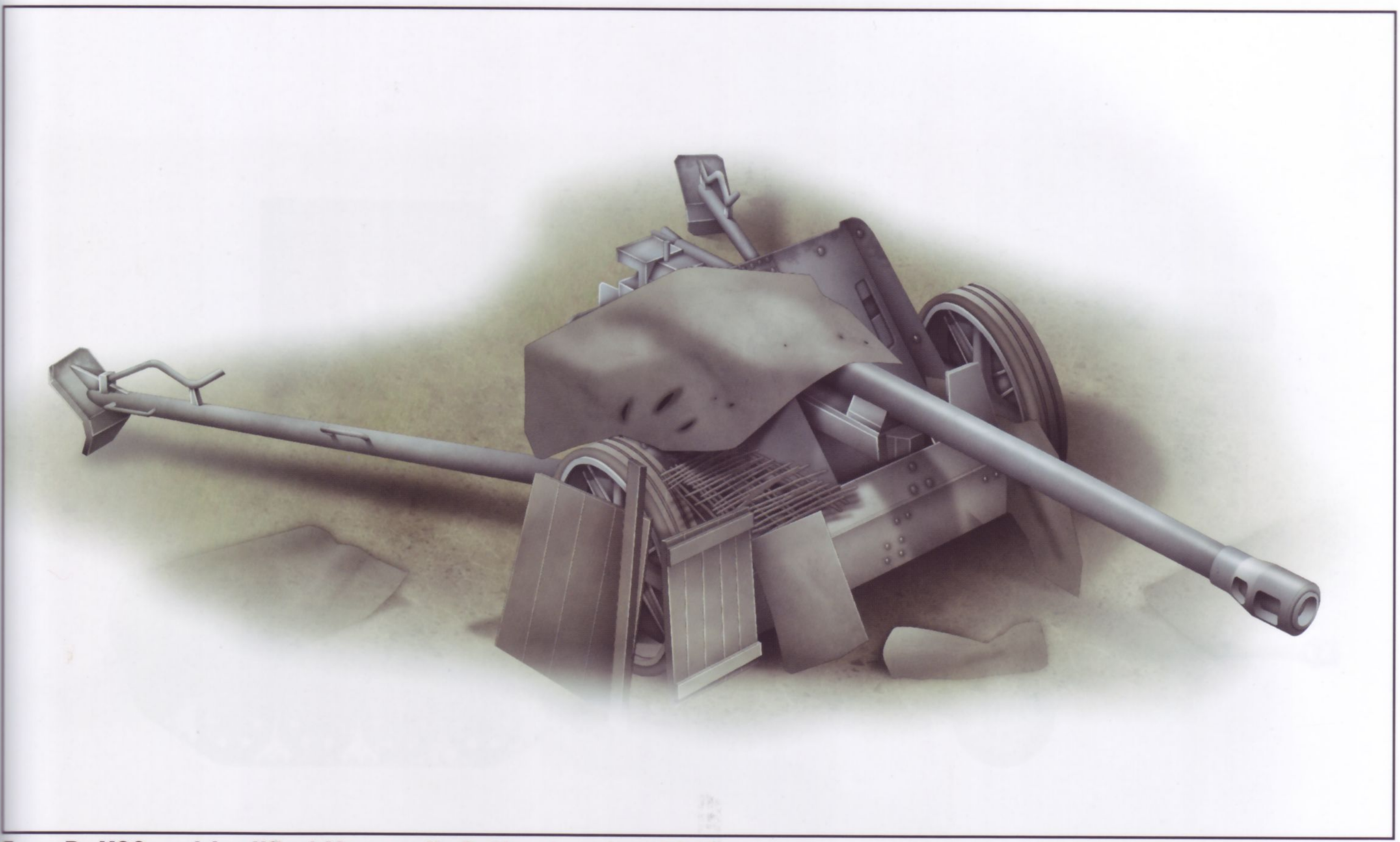
This quadruple mount was originally covered overall in Dunkelgrau RAL 7021; in this case it has been further camouflaged by a hand-applied coat of whitewash.



60cm FlaK-Scheinwerfer 36, unidentified Luftwaffe unit, time and place
This vital accessory to an anti-aircraft battery is finished overall in factory-applied Dunkelgrau RAL 7021.

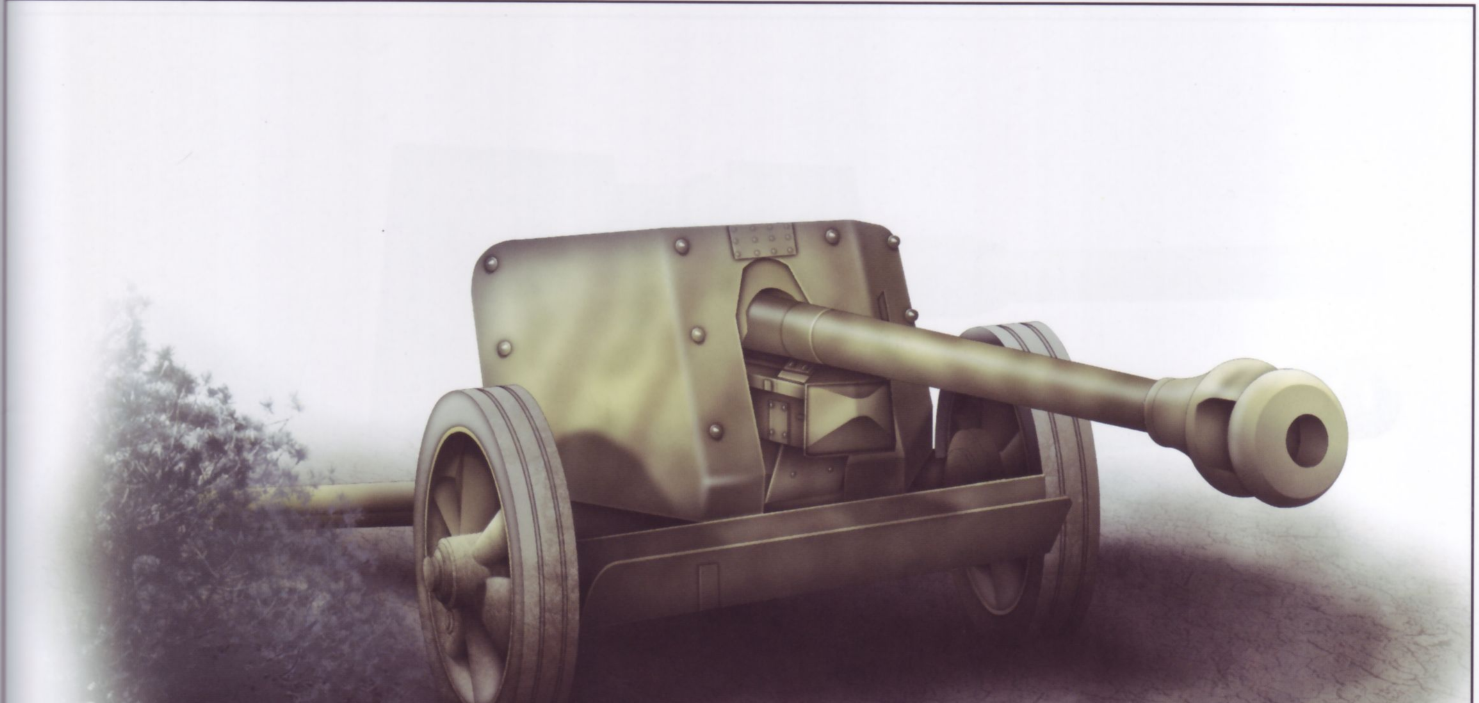


3.7cm PaK35/36 and Krupp L2H143 tractor, unidentified Heer unit, Germany, spring 1939
Prior to the Polish Campaign, German military equipment was re-finished in a new scheme consisting of a base color, Dunkelgrau Nr.46. This wa over-sprayed with Dunkelbraun Nr.45 in banded patches, so it covered roughly 1/3 of the item being painted. Note that the canvas cover o the PaK35/36 is still finished in the pre-war "feuersicherem Buntfarbenanstrich" three-tone system of Nr.17 Erdgelb-matt, Nr.28 Grün-matt and Nr.1 Braun-matt. In this case, the colors had a hard-edge pattern; others would have a sprayed, soft-edge pattern.



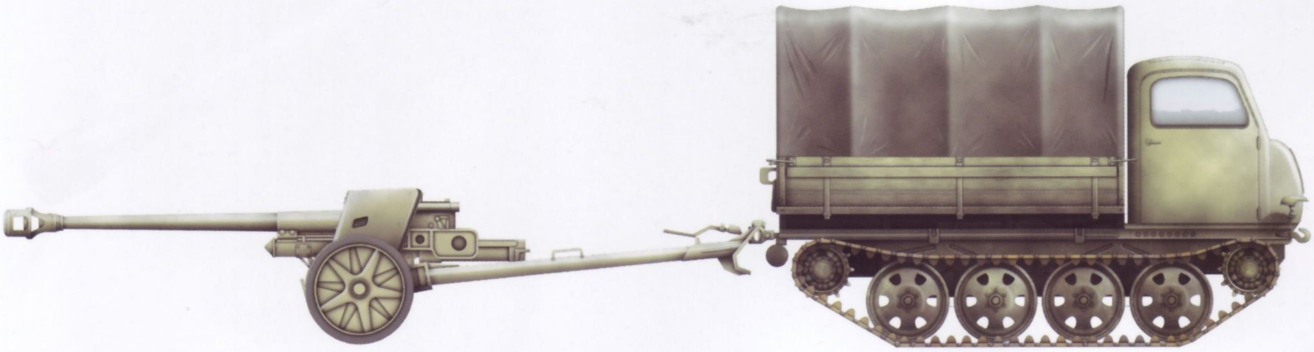
5cm PaK38, unidentified Heer unit, Ostfront spring 1942

This gun has been concealed by using local debris in order to hide its outline and make it blend in better with its urban surroundings. It is painted overall in Dunkelgrau RAL 7021.

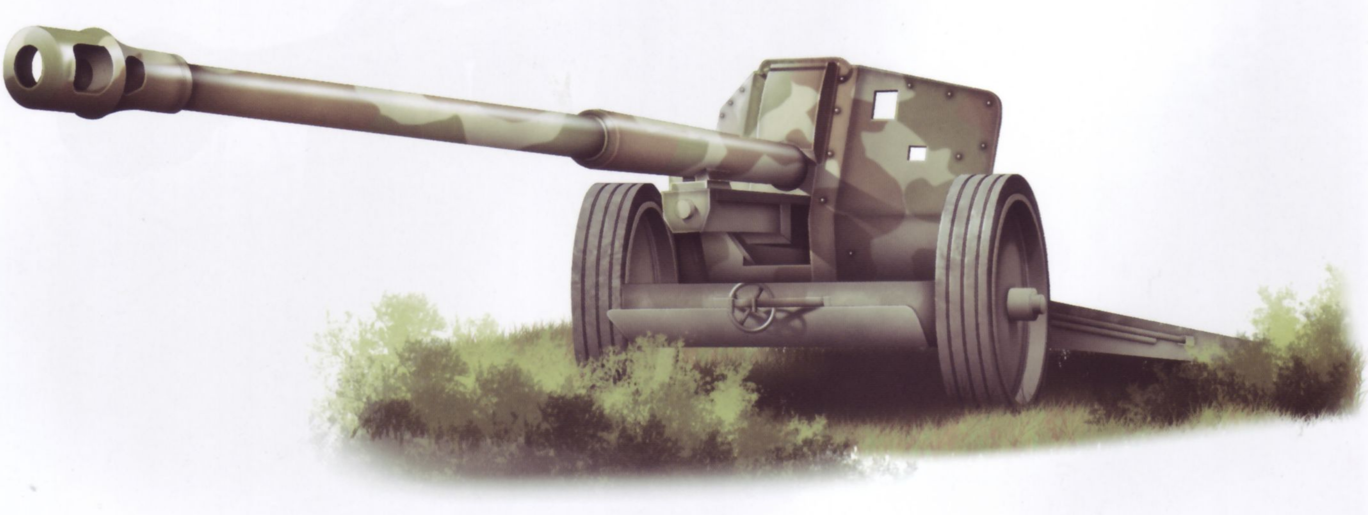


7.5cm PaK40, unidentified Heer unit, Ostfront spring 1943

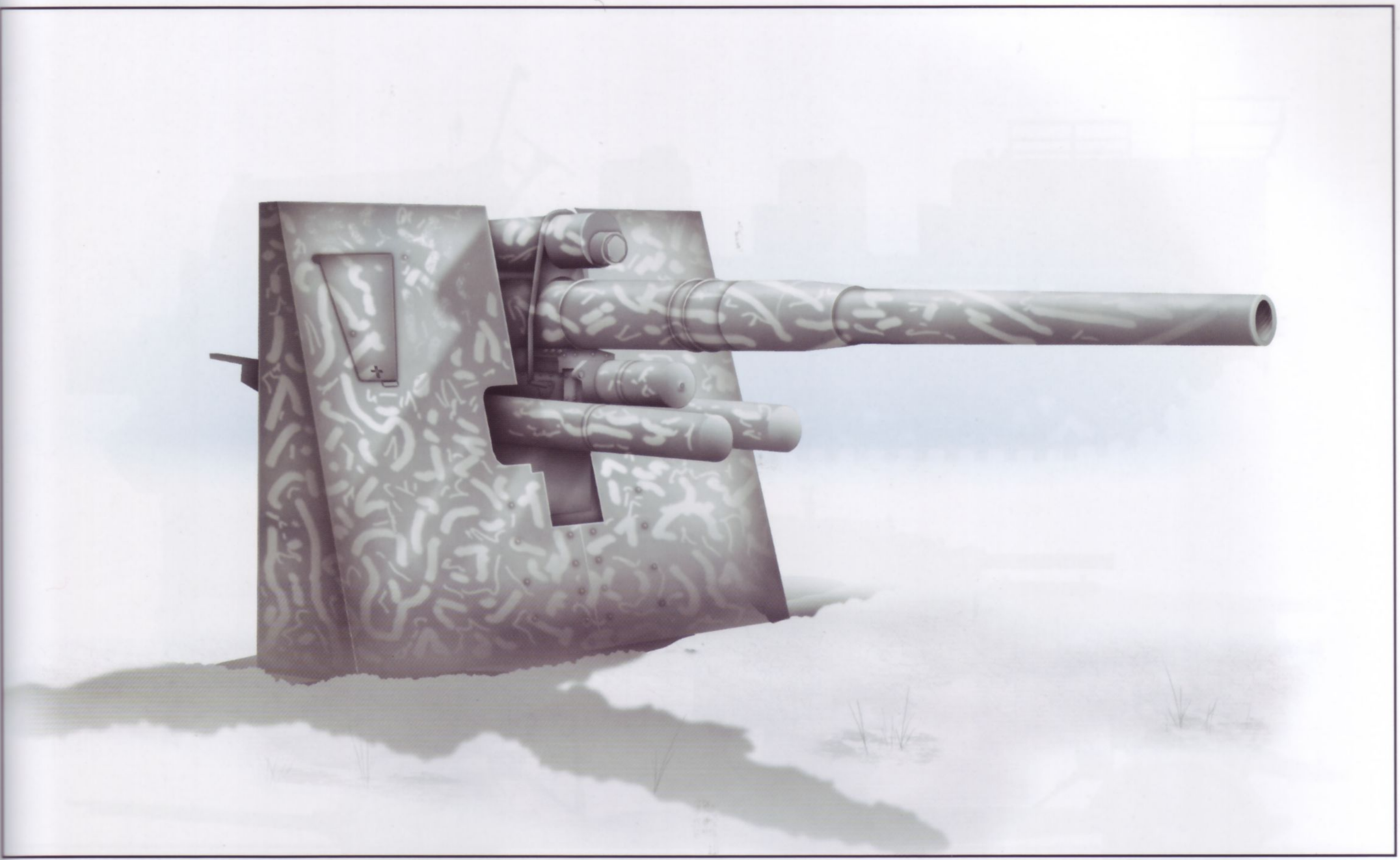
This gun is finished in a base color of Dunkelgelb RAL 7028. To this was added a very faded wavy camouflage pattern of Olivegrün RAL 6003 and Rotbraun 8017. When introduced, these colors were supplied to the troops as a paste, formulated to be mixed with any liquid medium including water and various petroleum-based products. As a result, the color density varied widely, while durability also suffered.



7.5cm PaK40 and Steyr RSO-01, unidentified Heer unit, Ostfront, summer 1943
Both the gun and its tractor are finished in a base color of Dunkelgelb RAL 7028, which has been heavily discolored with a coating of dried mu
and/or fresh dust.

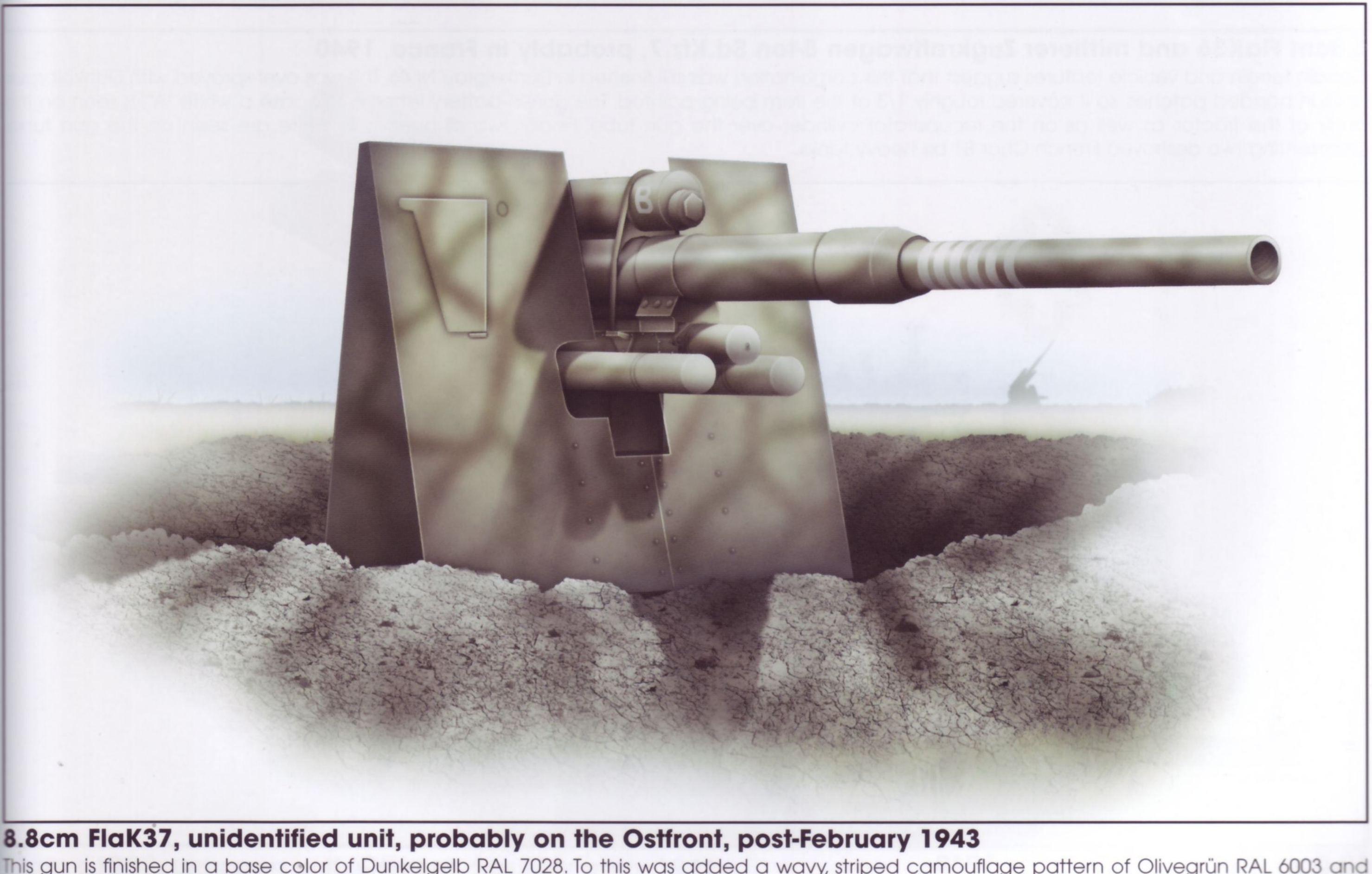


8.8cm PaK43/41, as seen at a weapons display probably in the summer of 1944
It is finished in a base color of Dunkelgelb RAL 7028. To this was added a "cloud" camouflage pattern of Olivegrün RAL 6003 and Rotbraun 8017
with hard edges.



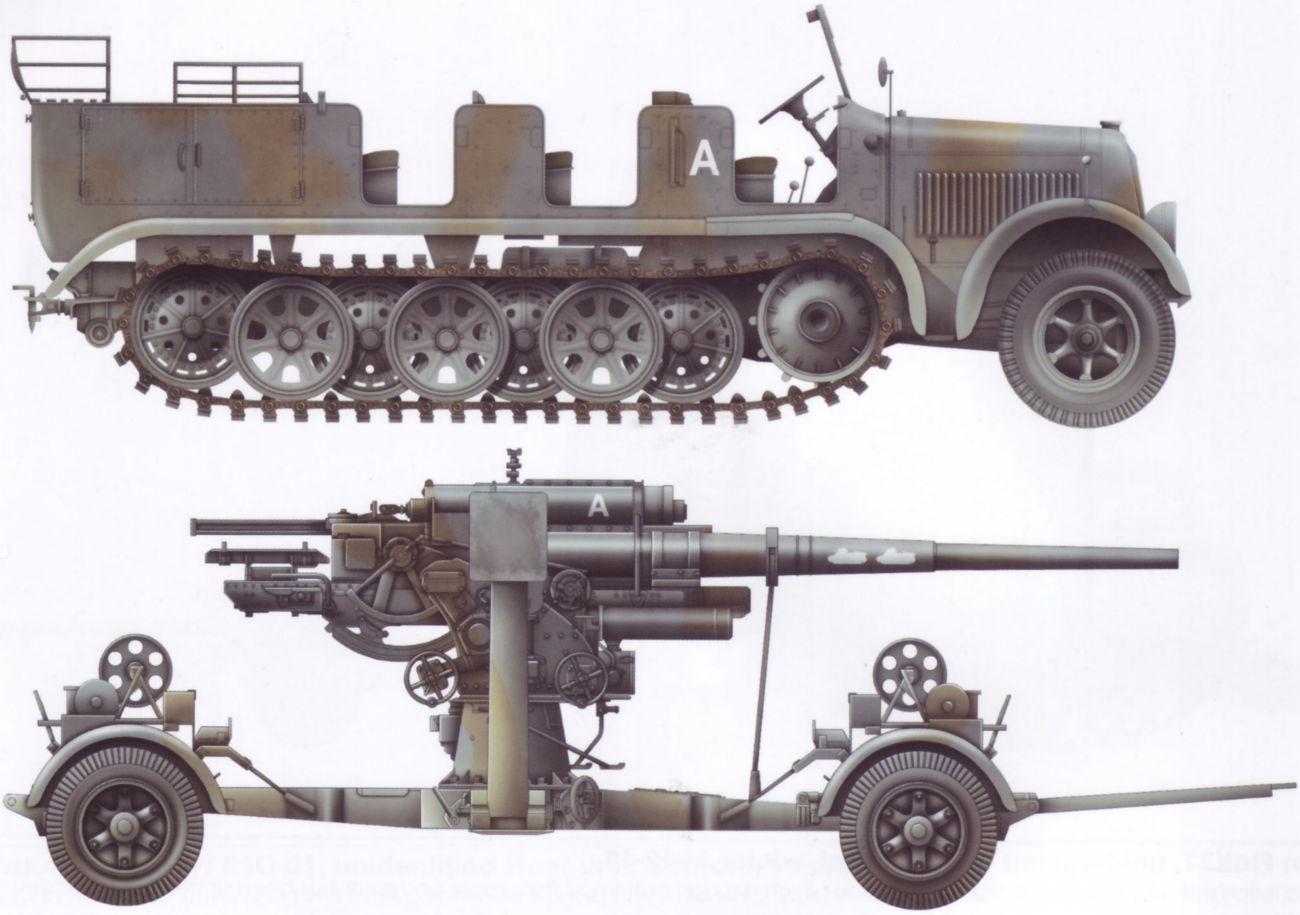
8.8cm FlaK37, unidentified unit, Ostfront, winter 1942-43

This gun is finished overall in Dunkelgrau RAL 7021 to which a rough pattern of thin waves and spots has been applied, using whitewash.



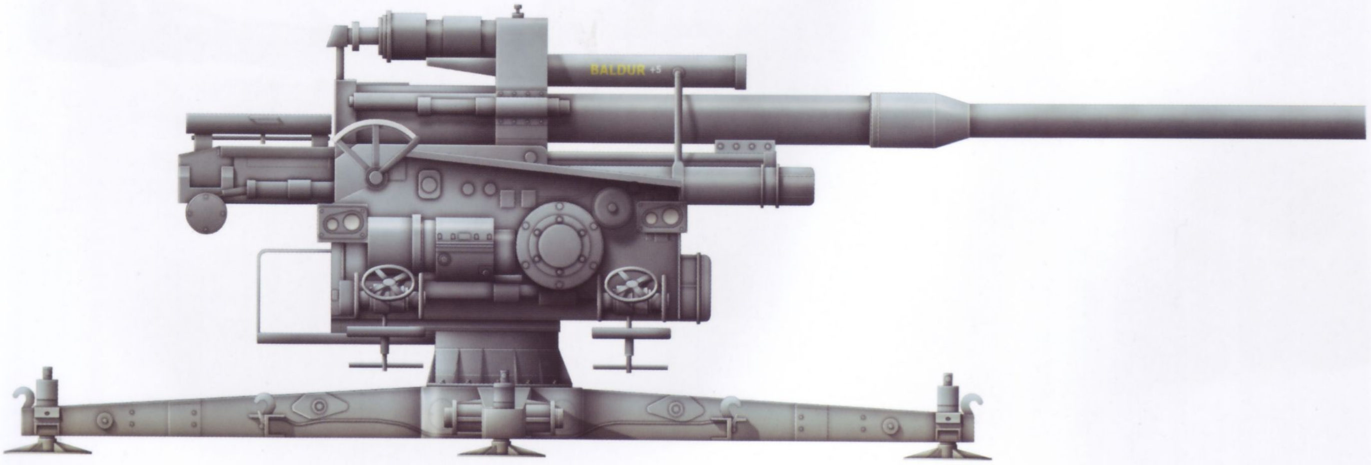
8.8cm FlaK37, unidentified unit, probably on the Ostfront, post-February 1943

This gun is finished in a base color of Dunkelgelb RAL 7028. To this was added a wavy, striped camouflage pattern of Olivegrün RAL 6003 and Rotbraun 8017 on the entire piece. The sectional gun tube features six "kill" rings in white, while the gun-in-battery letter, "B", is seen (also in white) on the forward section of the recuperator cylinder.



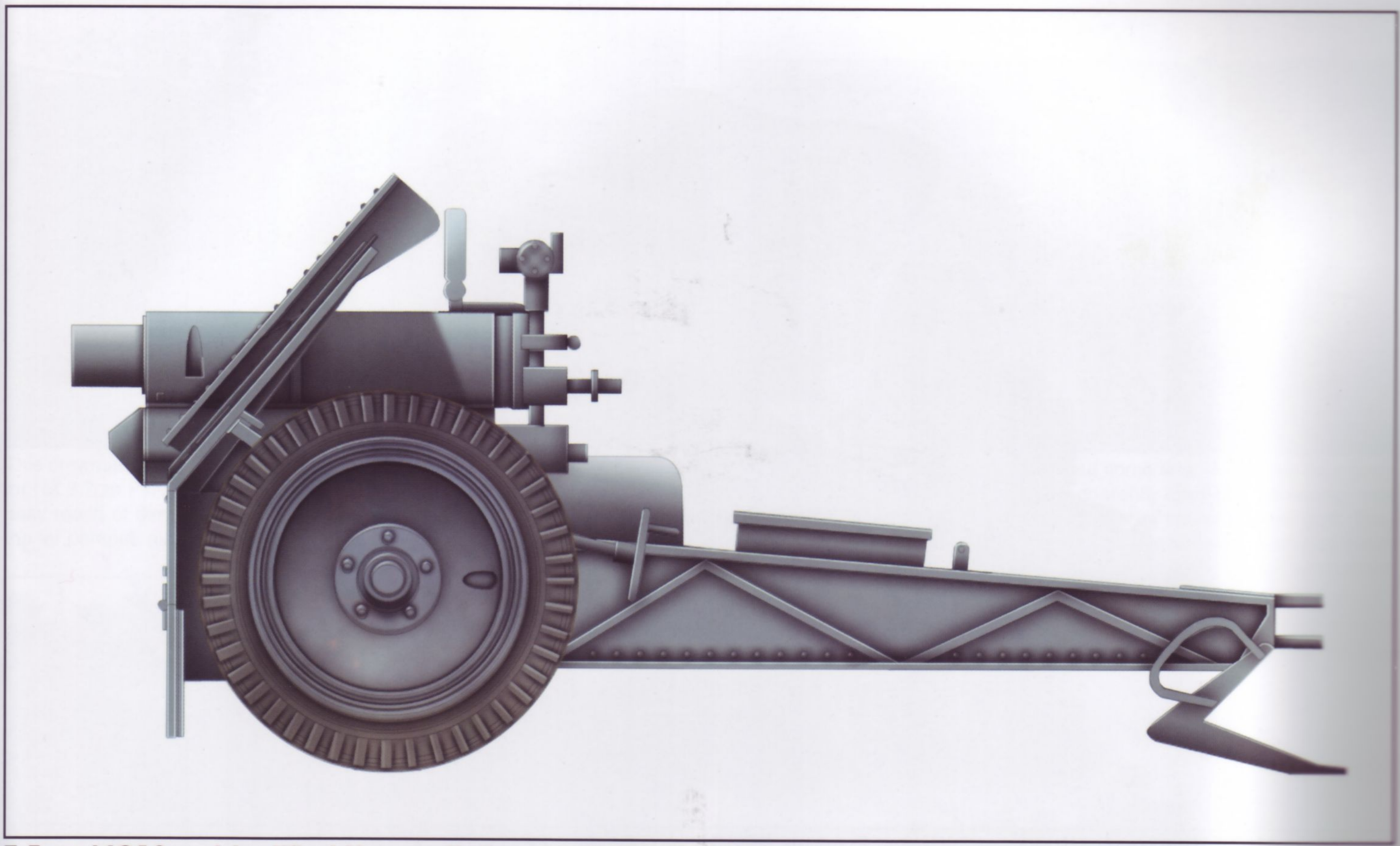
8.8cm FlaK36 and mittlerer Zugkraftwagen 8-ton Sd.Kfz.7, probably in France, 1940

Certain terrain and vehicle features suggest that this combination was still finished in Dunkelgrau Nr.46. This was over-sprayed with Dunkelbraun Nr.45 in banded patches, so it covered roughly 1/3 of the item being painted. The gun-in-battery letter, in this case a white "A", is seen on the body of the tractor, as well as on the recuperator cylinder over the gun tube. Finally, two silhouettes in white are seen on the gun tube, representing two destroyed French Char B1 bis heavy tanks.



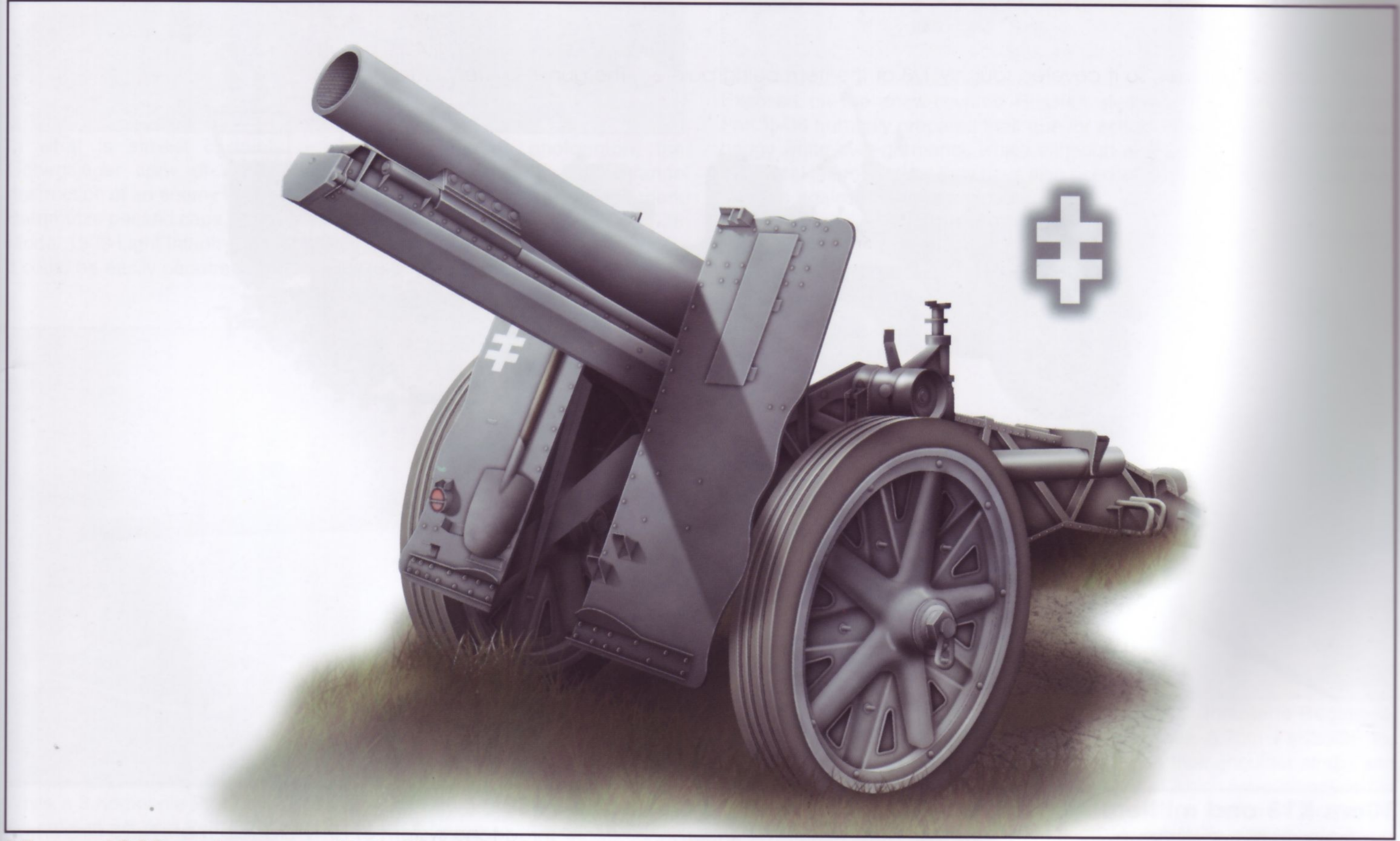
10.5cm FlaK38/39, Germany 1942

This emplaced piece was finished overall in Dunkelgrau RAL 7021. It carried a name, "Baldur" painted in yellow, on the recuperator cylinder; just forward of this is a "+5", painted in white, whose purpose is unknown.



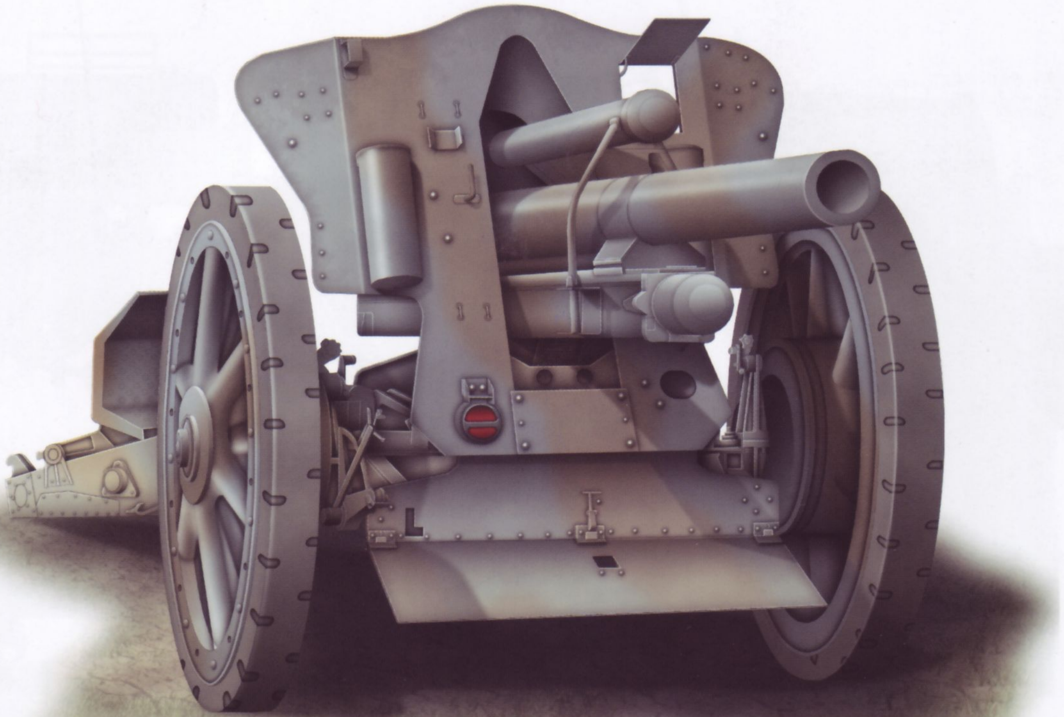
7.5cm l.IG18, unidentified Heer unit, time and place unknown

This light infantry gun is finished as it would have appeared after June of 1940, in overall Dunkelgrau RAL 7021. If a new piece, this color would have been applied at the factory after the time mentioned. If issued prior to that time, it would have been re-painted by the using unit, when time permitted and the paint was made available.



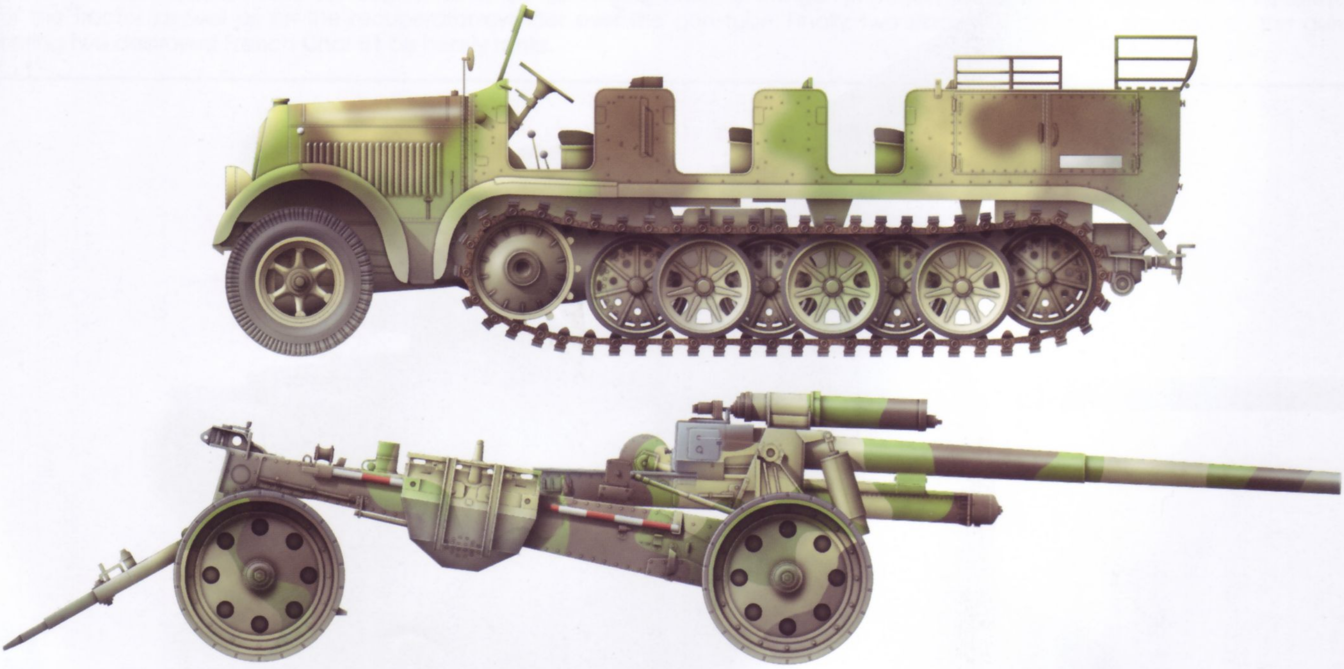
15cm s.IG33, unknown unit, Ostfront, possibly early 1942

This heavy infantry gun is painted overall in the standard Dunkelgrau RAL 7021. Unusually, it carries the double cross insignia of the 79. or 169.Infanterie-Division on its shield.



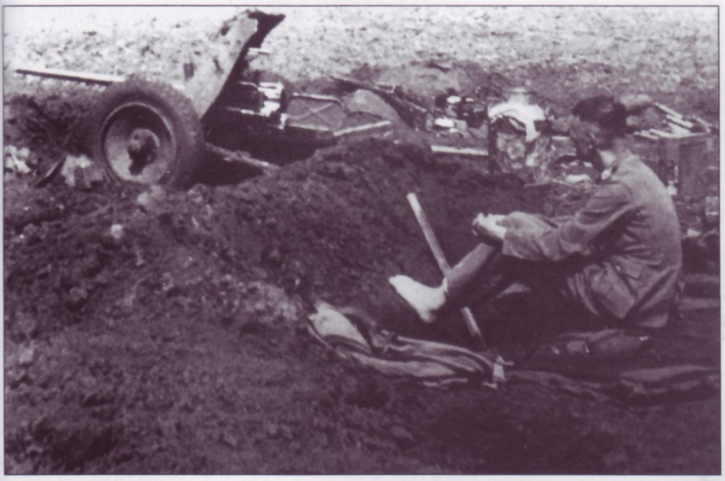
10.5cm l.FH18, Panzergruppe von Kliest, France 1940

The gun is finished in the standard factory-applied finish at the time, which was Dunkelgrau Nr.46. This was over-sprayed with Dunkelbraun Nr.45 in banded patches, so it covered roughly 1/3 of the item being painted.

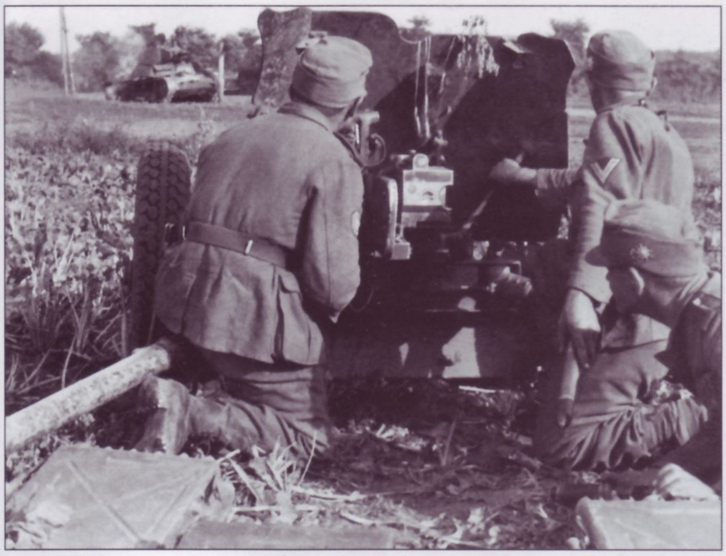


10cm K18 and mittlerer Zugkraftwagen 8-ton Sd.Kfz.7, Germany 1938

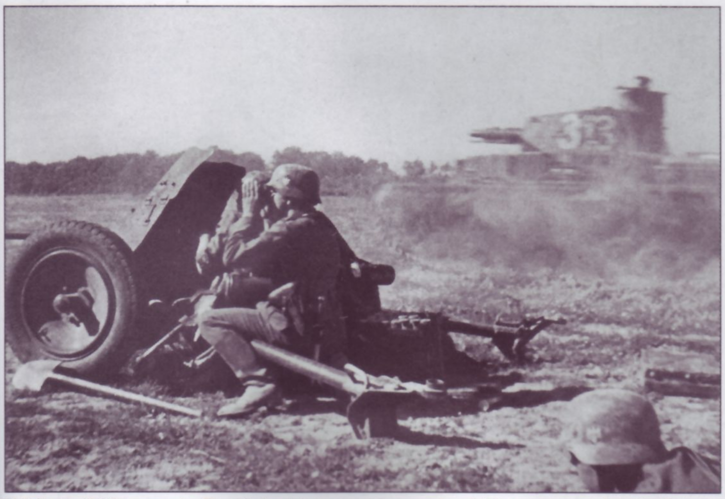
This gun and its tractor are finished in the pre-war "feuersicherem Buntfarbenanstrich" three-tone system of Nr.17 Erdgelb-matt, Nr.28 Grün-matt and Nr.18 Braun-matt. In this case, the colors have a sprayed, soft-edge pattern on the tractor and a hard-edge pattern on the gun, making for an interesting contrast. The tractor also has registration plates painted in five locations: two on the bumper, one on each side of the body located on the ammunition locker doors, and the last one on a plate on the rear of the body.



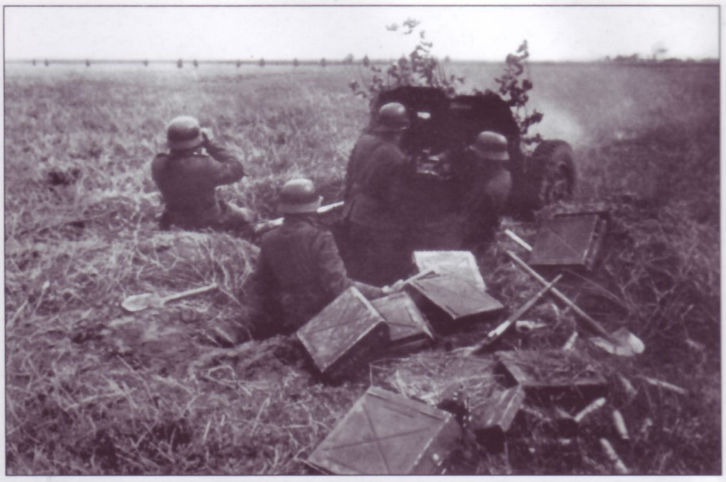
This crewman takes a break while cooling his feet as he prepares a position for his 3.7cm PaK35/36. Note that there are ready ammunition boxes within easy reach of the gun, as well as a Kar98k rifle and some foodstuffs lining the far parapet, also within easy reach.



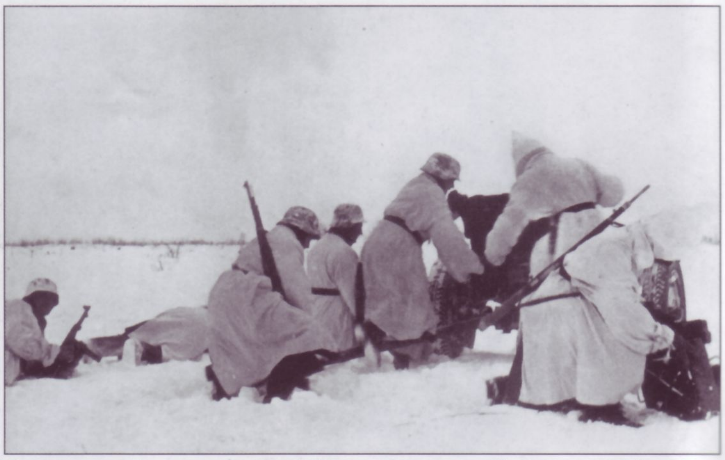
In what is almost certainly a staged propaganda photograph, the Gebirgsjäger crew of this 3.7cm PaK35/36 simulates the close-range destruction of an enemy tank; note the Edelweiss insignia on their trade-mark Bergmütze peaked caps. In this case the "victim" appears to be a Soviet T-26 Model 1939 Light Infantry Tank. With a maximum armor basis of only 25mm, it could be easily penetrated by this gun at ranges in excess of 400-meters.



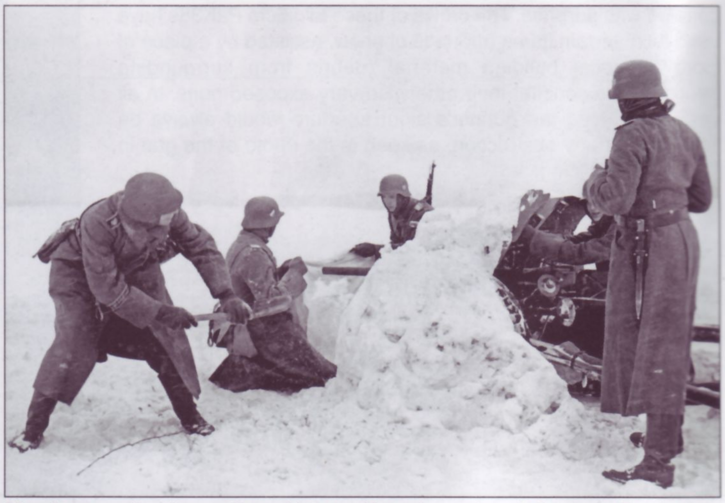
While a 3.Kompanie Pz.Kpfw.IV (possibly an Ausf.A) raises a cloud of dust, the crew of a 3.7cm PaK35/36 stands by with their gun in support. The usual gear is scattered about the gun, to include a spade and ammunition boxes; note also that the crewmen have smeared mud over their M1935 helmets to diminish any reflections, but that the national eagle has been left un-covered.



The crew of this 3.7cm PaK35/36 has had some time to improve their gun's relatively exposed position, even while apparently engaging the enemy; note the smoke in front of the gun and the spent shell cases at lower right. They have broken up their gun's outline with some evergreen branches, while scattered about are entrenching tools, a Kar98k rifle and several ammunition boxes.

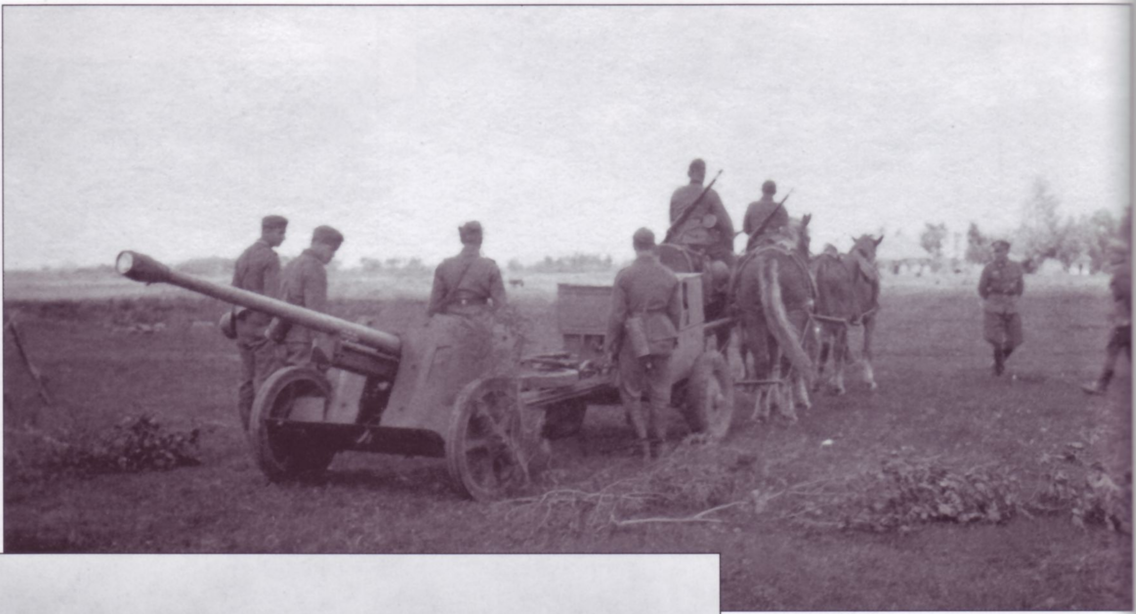


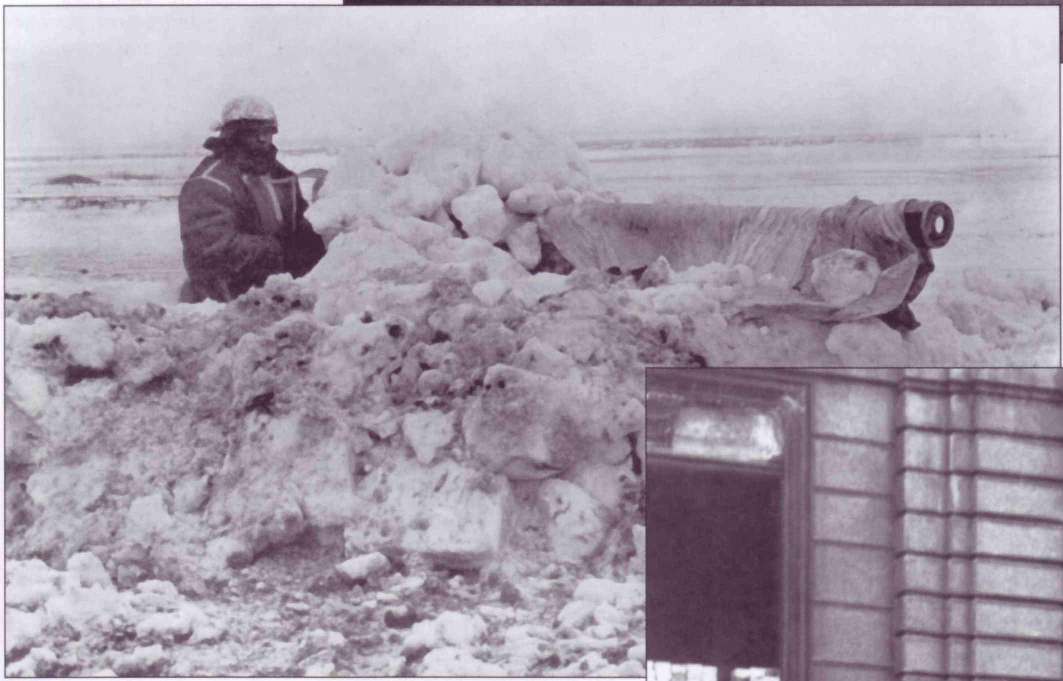
Exposed on the snow-covered Russian steppes, the crew of this 3.7cm PaK35/36 hurriedly prepares their gun for action. Note that the men all wear baggy white over-garments, which although of a uniform design, appear to be a local improvisation; they have also used white paint to help conceal their helmets against the snowy terrain.

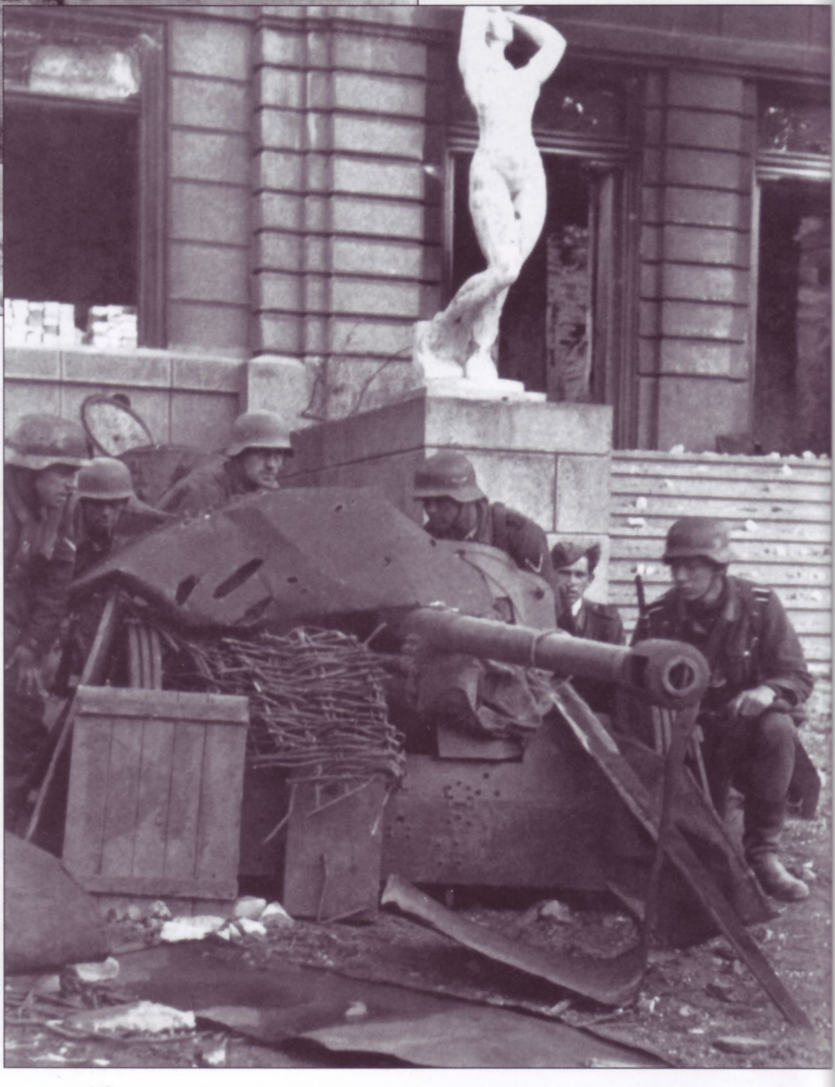


Members of the elite Heer (Army) unit, Infanterie-Regiment-Großdeutschland (Greater Germany), prepare their 3.7cm PaK35/36 for action in the snow. Note the distinctive ciphers on their shoulder straps and the cuff-band title on their field greatcoats, both of which were introduced in June 1939. Hitler's short-sighted plans envisioned that German troops would be in secure "winter quarters" in late 1941, which is why it was over-optimistically thought that their standard-issue M1935 field greatcoats would suffice to carry them through. The Red Army and "Mother Russia", of course, had other ideas!

Under the gaze of their officer, the crew of this 5cm PaK38 awaits further orders. Note that the gun is attached to a caisson, which is drawn by four horses, indicating that this gun is attached to an Infanterie-Division. Characteristic features of the PaK38 were the curved faces of the spaced-armor gun shield and the third castor wheel stored on the trail legs when not in use.

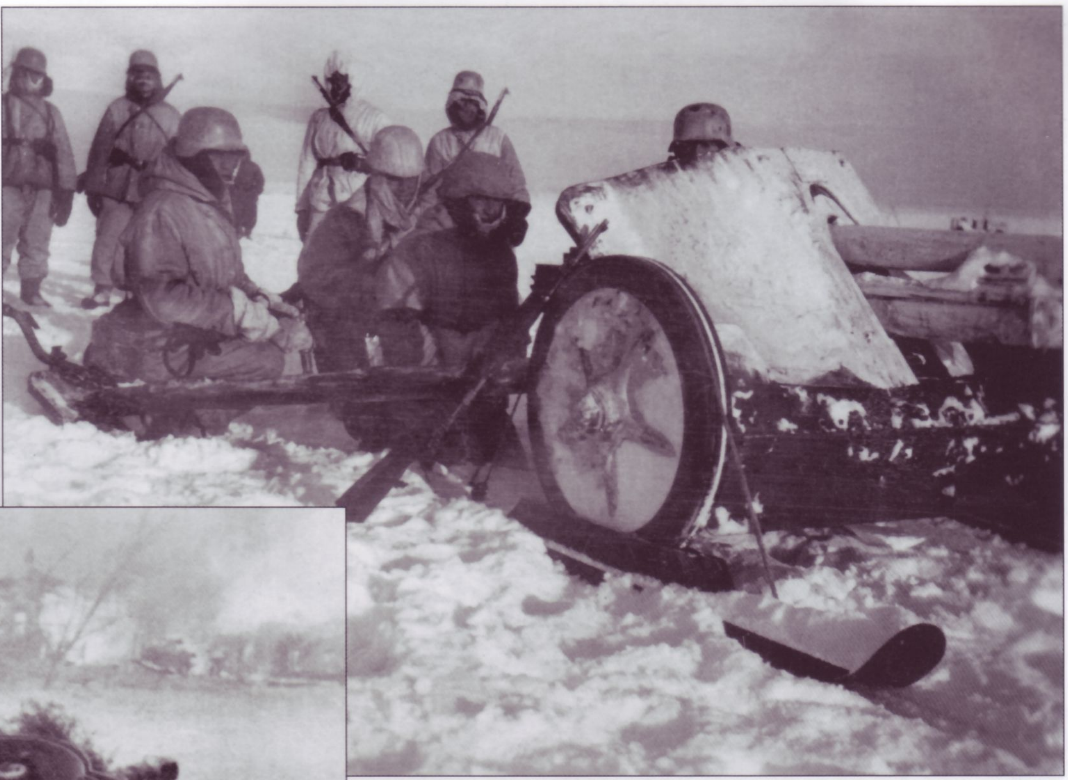


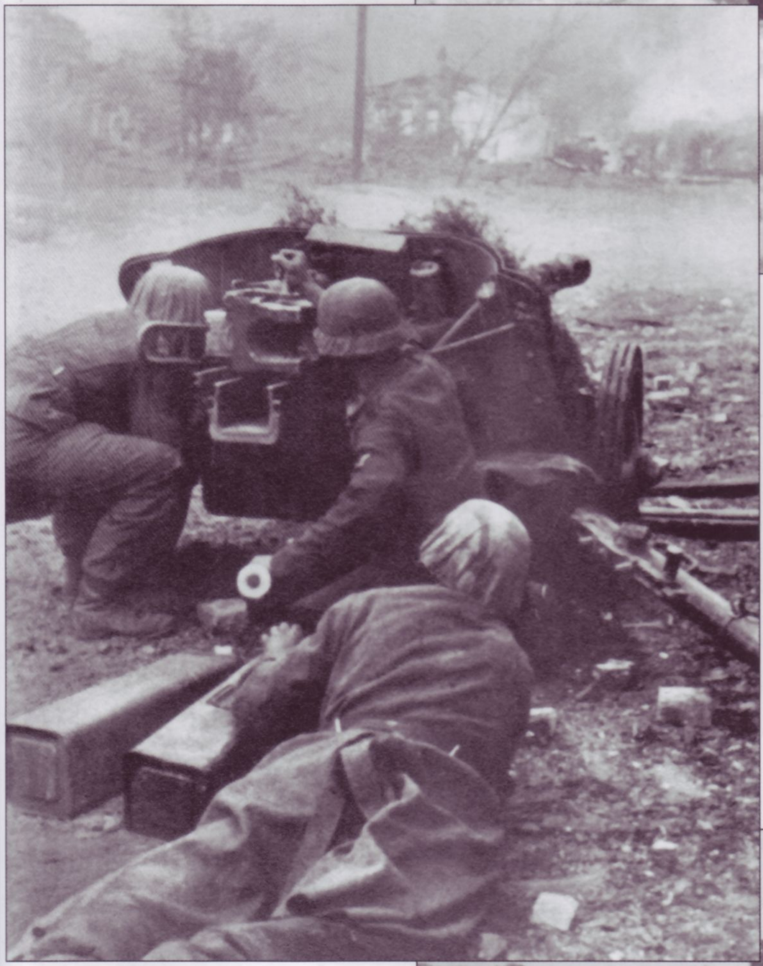




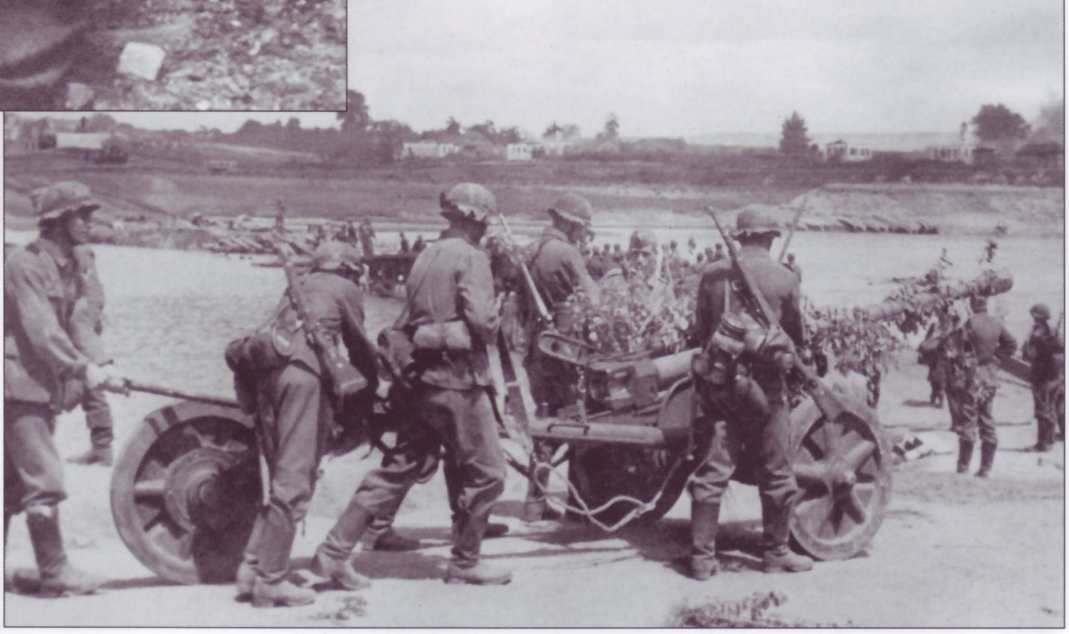
The key to survival in the anti-tank "business" was concealment, coupled with surprise. The crews of these two 5cm PaK38s have used local terrain items (mounds of snow, assisted by a piece of cloth) or local building material (debris from surrounding structures) to conceal their otherwise very exposed guns. In all cases, however, the gunner's sight aperture would always be kept clear of any obstruction, as seen in the photo of the gun in front of the building.

The deep snows of the Ostfront would often hinder mobility of wheeled vehicles and artillery. In this instance, this 5cm PaK38 has been fitted with quite oversized "skis" in order to enhance the piece's mobility. The gun's Schutzschild (splinter shields) have also been whitewashed for additional cover in the snow.

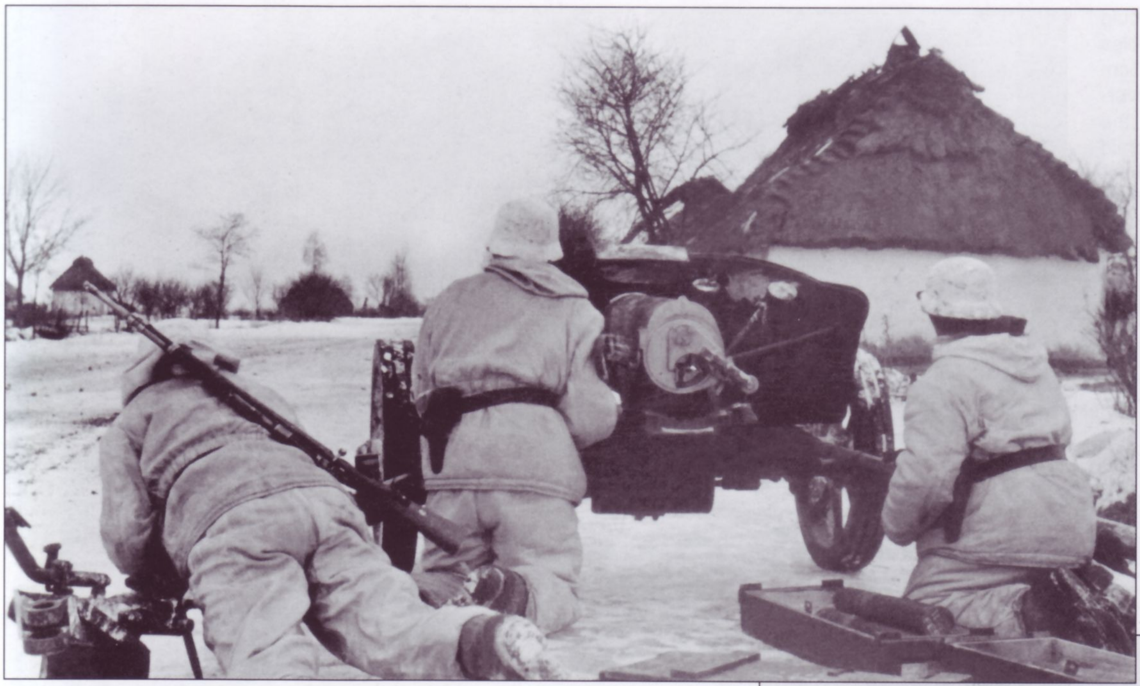




As fires rage in the background, this 5cm PaK38 engages the enemy. Note the characteristic curved, spaced-armor Schutzschild (splinter shields), which easily differentiate this piece from the similar, but larger, 7.5cm PaK40. Note two, four-round ammunition containers, from which the loader has just taken a round as he also manipulates the breechblock.

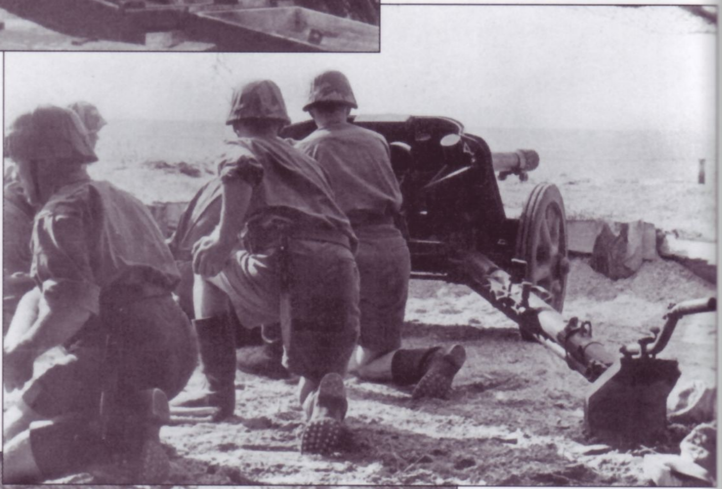


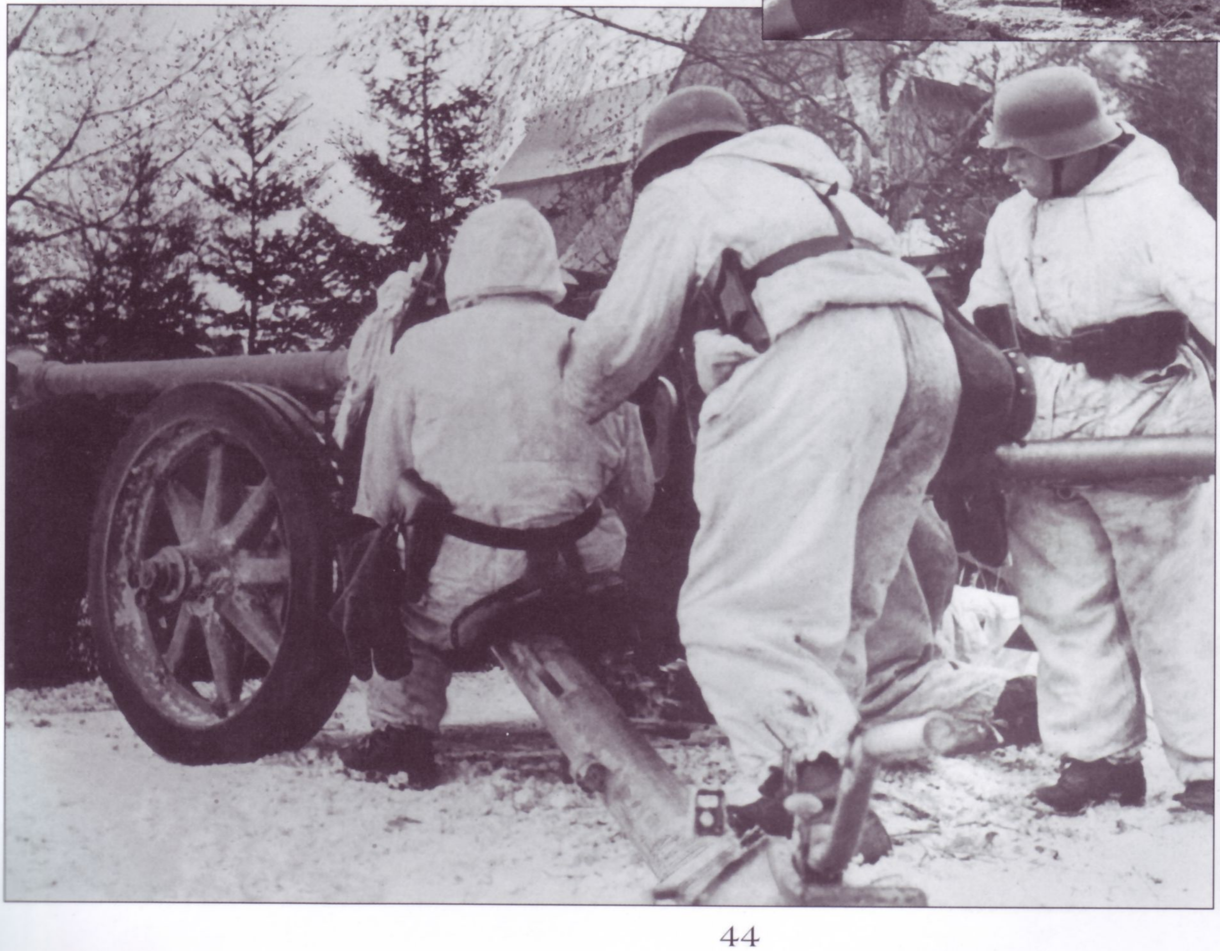
This photograph provides an excellent view of a 5cm PaK38 in travel order, configured for man-handling. Note the castor wheel in place, with the last man holding the "tiller" handle, which was used to steer the piece. The gun tube has also been retracted in the recoil slide to shorten the piece and shift the center of gravity. Finally, the recoil slide has been secured to a transverse bracket, which itself is attached to both of the closed trail legs.



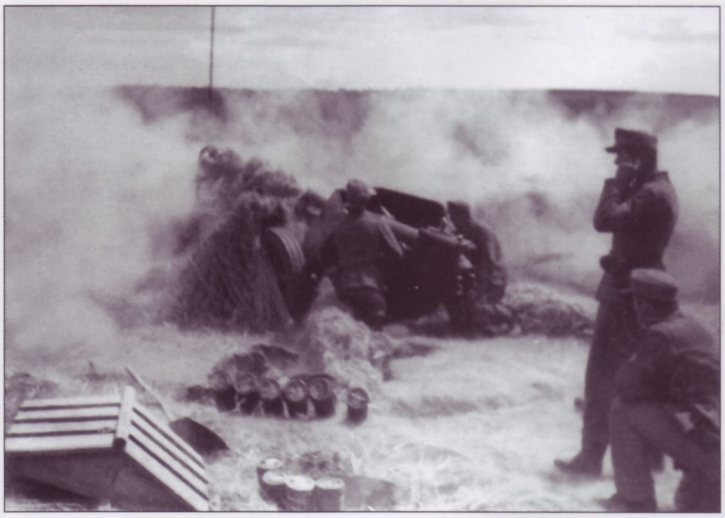
A large number of French 75mm Mle.1897 field guns were captured during the 1940 campaign. They were eventually pressed into service on the Ostfront as the 7.5cm PaK97/38, based on the 5cm PaK38 carriage. Note the distinct Nordenfeld breech block of the type (which identifies the piece from this angle) and the ready ammunition scattered about in wooden packing crates.

In a rather more pleasant atmosphere than seen in the previous photograph, these troops man a 7.5cm PaK97/38 on one of the southern battle fronts, possibly Sicily. The second distinguishing feature of this piece was the tubular, perforated Solothurn-designed muzzle brake, as seen fitted to the bore of the gun tube.

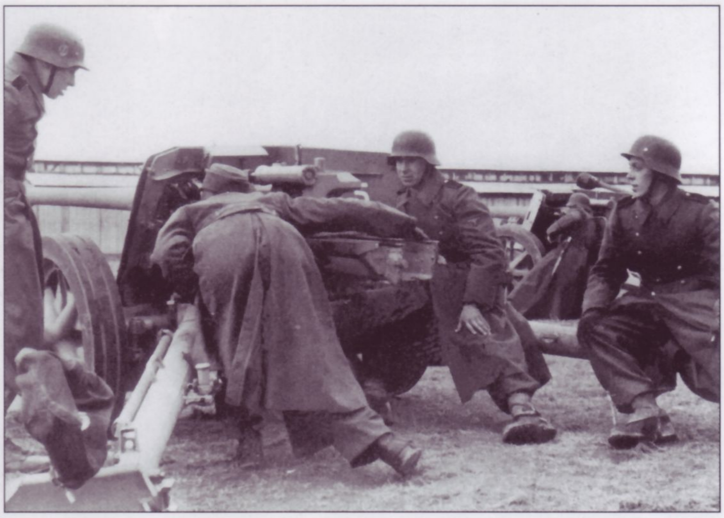




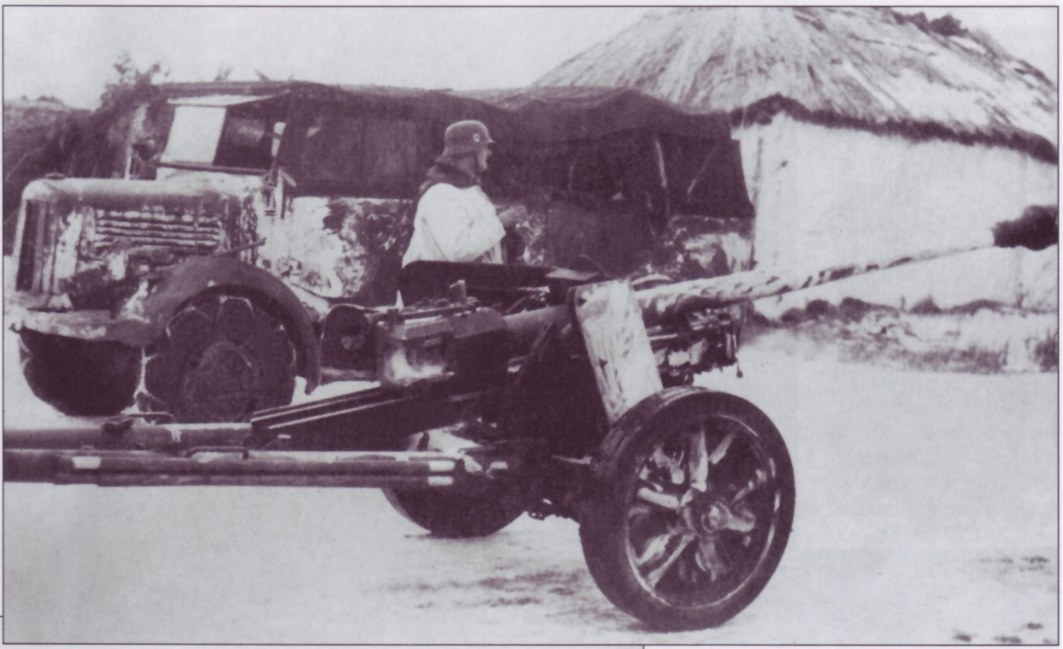
Essentially an enlarged version of the 5cm PaK38, the 7.5cm PaK40 closely resembled its forbear. Note the long (L/46 caliber) gun tube with the distinct double-baffle muzzle brake, as well as the very long complete round being placed in the breech. All of these items, as well as the variety of wheel hub styles (here, a rubber-tired type with eight spokes is seen) were characteristics of this gun.



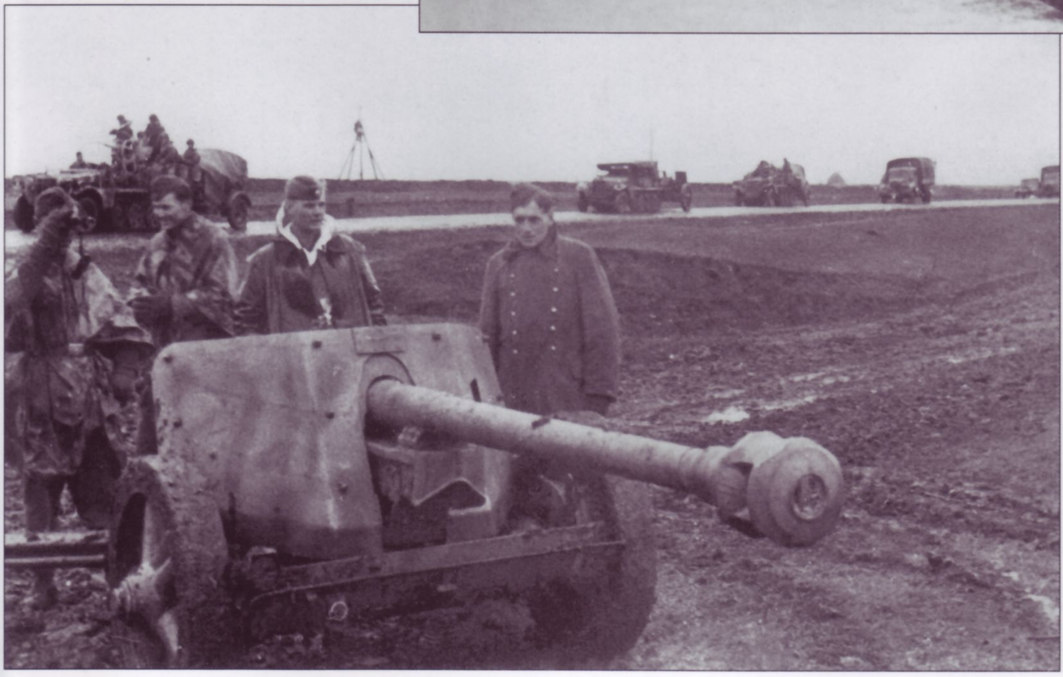
Although they used so-called "smokeless" powder, the shock wave caused by the discharge of this 7.5cm PaK40 has raised a large, tell-tale cloud of dust. One effect of the baffles in the muzzle brake can be noted here in that the dust cloud dissipates to either side of the gun, which the photographer has caught in full recoil. The piece seems to be firing in an indirect role, or at a distant line-of-sight target, judging by the elevation of the gun tube.



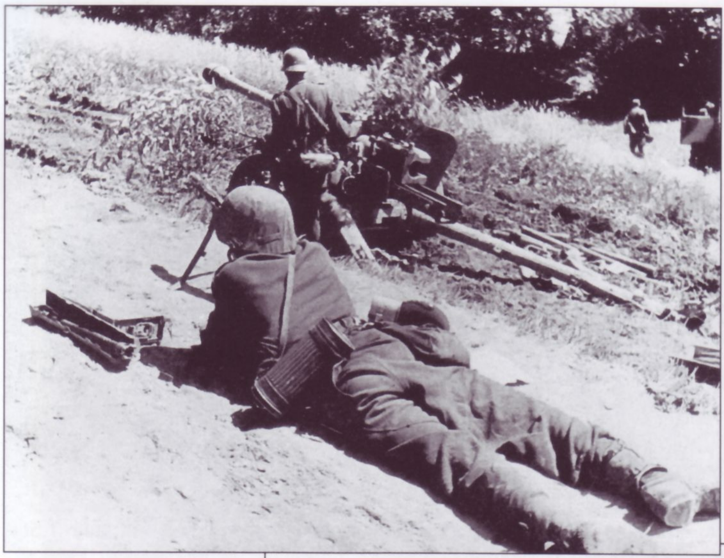
A group of Waffen-SS troopers familiarize themselves with their 7.5cm PaK40s. These particular guns were produced sometime after February 1943 as can be attested to by their base color, Dunkelgelb RAL 7028. At left, note the spaced-armor configuration of the gun shields.



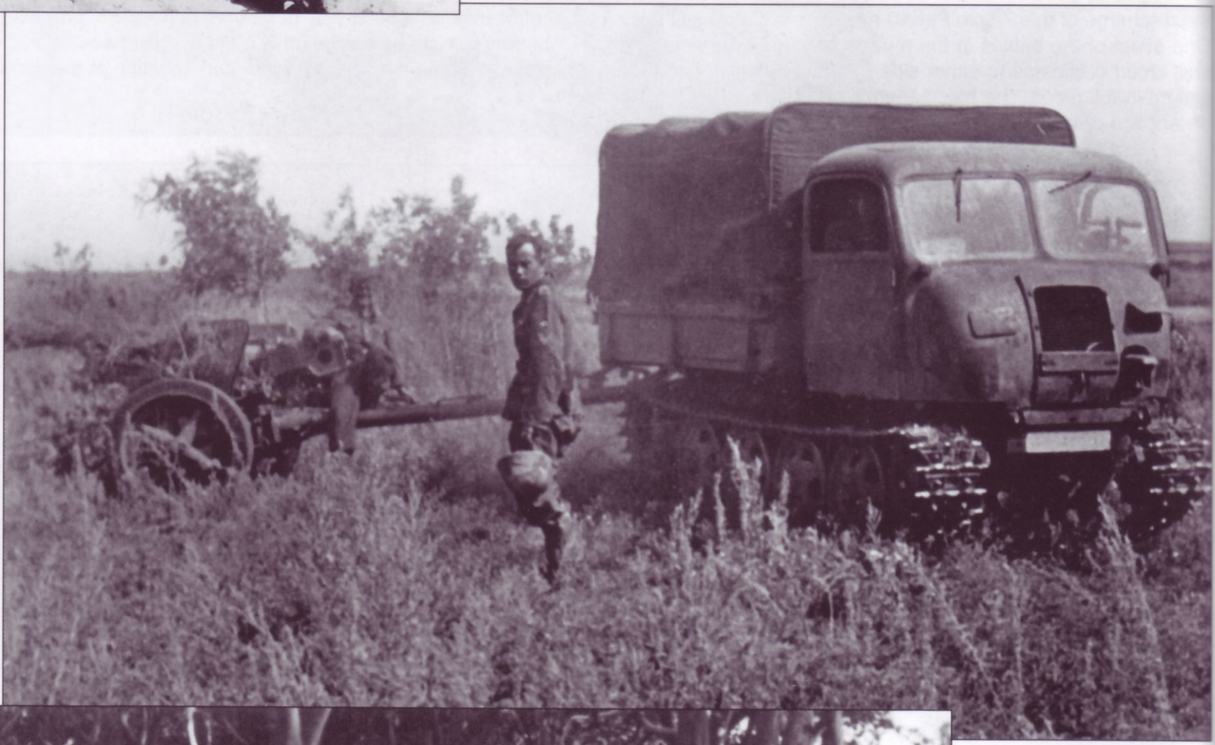
Attached to an un-seen tractor, this 7.5cm PaK40 is configured in travel mode. Note, as was the case with the PaK38 seen in a previous image, how the recoil slide is clamped transversely to the closed trail legs. However, in this case, the gun tube has not been retracted to shorten the piece's overall length for ease in handling tight turns. The wheeled vehicle in the background is a Mercedes-Benz L1500A medium cross-country car.



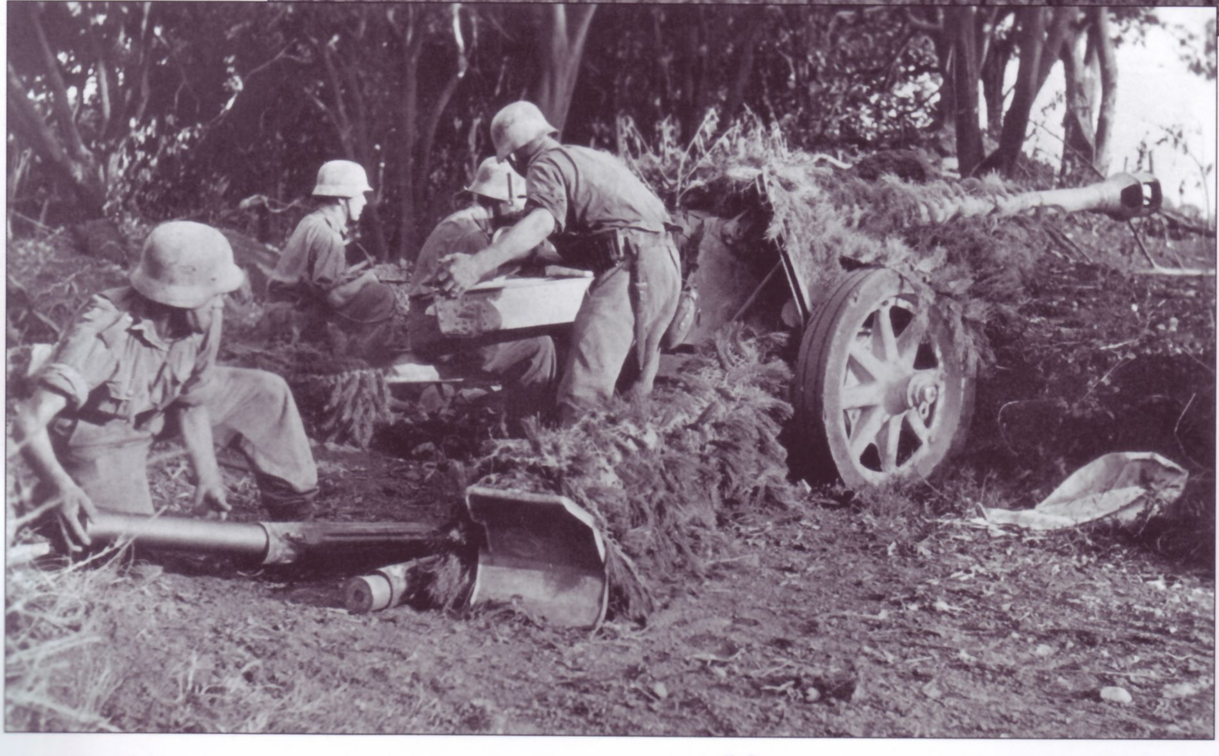
Painted in a mottled camouflage pattern over the Dunkelgelb RAL 7028 base color, this 7.5cm PaK40 covers a well-used road. Note the folded-up shield extensions at lower front and the wire that runs through the holes in the bolts that hold the main shields in place; this was used to hold foliage in place for concealment. Several Sd.Kfz.10 tractors are seen on the road in the background, some of which are pulling 15cm s.IG33 heavy infantry guns.



With his MG42 general-purpose machine-gun, spare barrel and ammunition at the ready, this soldier covers his comrades as they prepare their 7.5cm PaK40 for its day's work. Note the tractor parked in a defiladed position, near the tree line, ready for rapid displacement should the need arise.

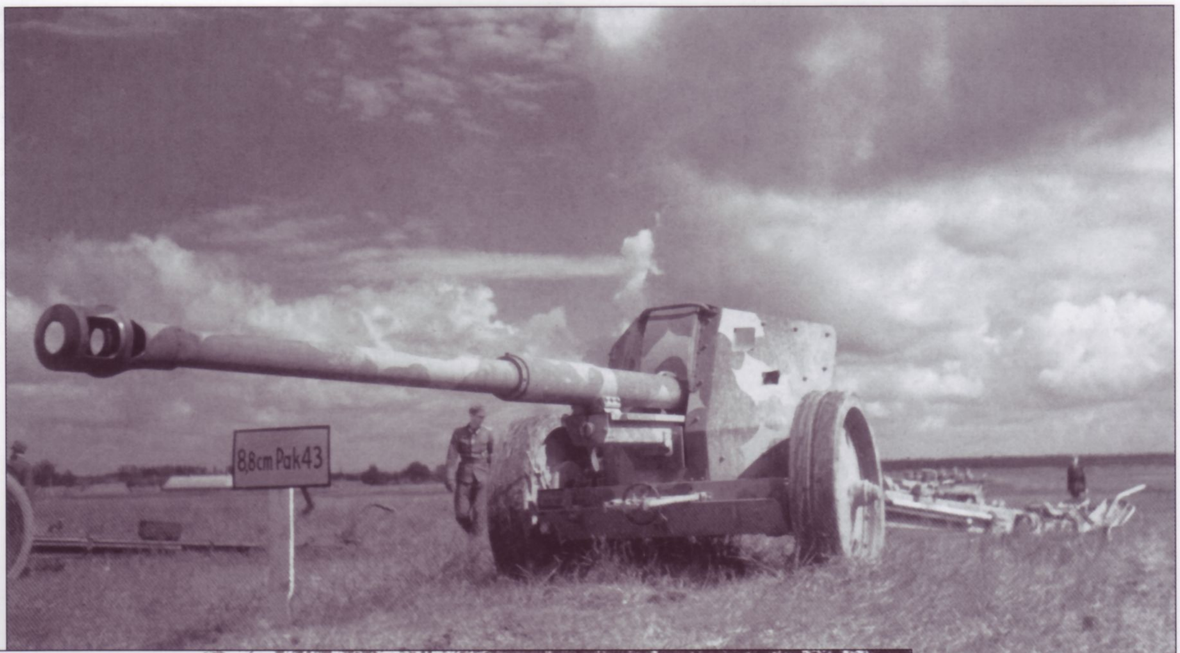


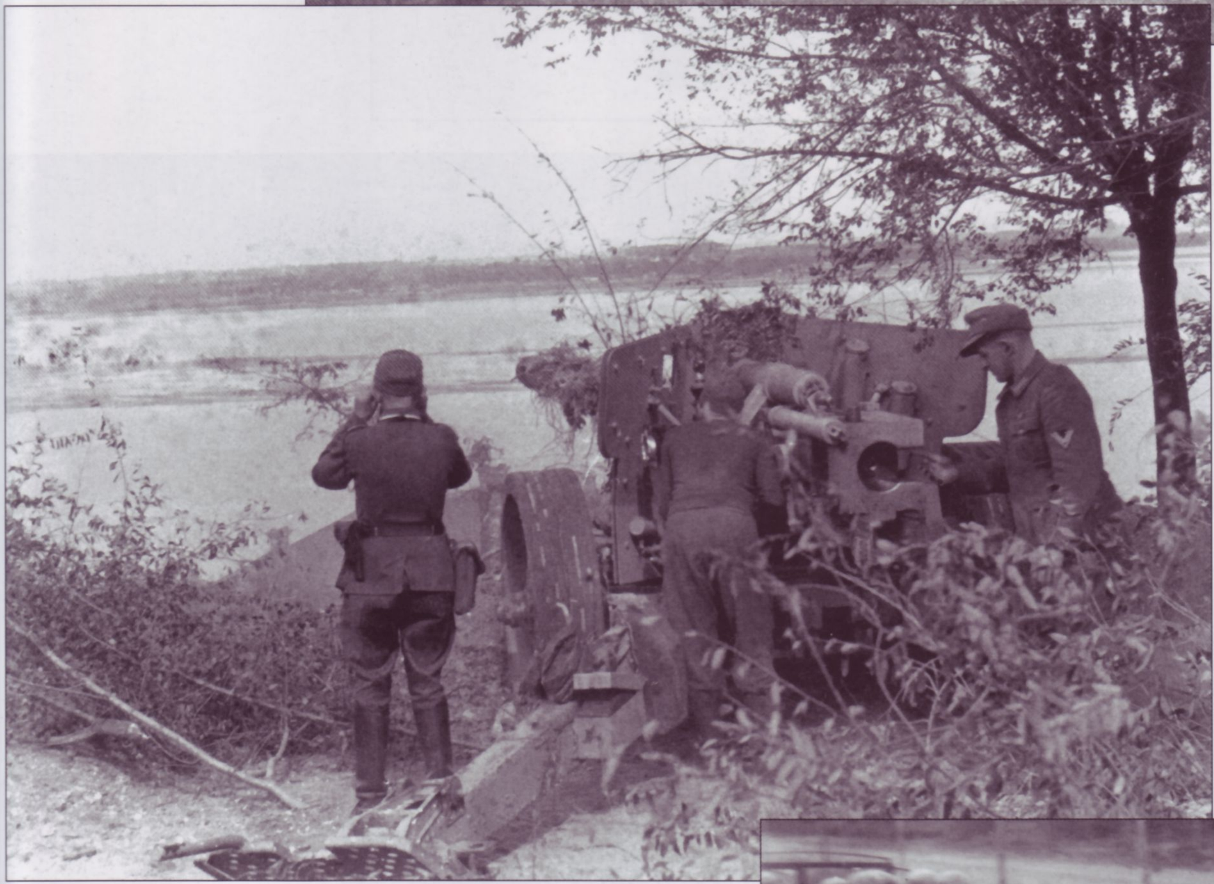
Sometimes misidentified in other publications, this photo depicts a 7.5cm PaK40; it is confirmed as such by the gunner's recoil guard, which is of an entirely different configuration when compared to the "U"-shaped type on the 5cm PaK38. This well-camouflaged piece is being hauled by a Steyr RSO tractor, probably on the Ostfront.



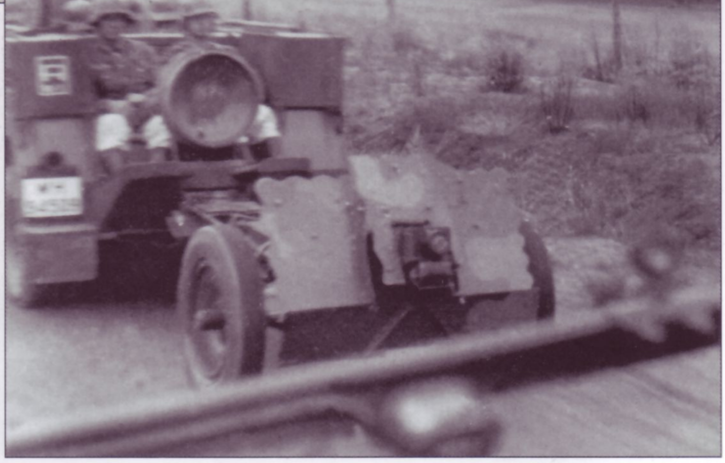
This crew has very skillfully placed their 7.5cm PaK40 behind an earthen berm adjacent to a tree-line. Much care has also been taken to wrap the trail legs, gun tube and shields in evergreen foliage to further conceal the piece. Note how the ammunition handler is decanting a round from its metal packing tube, prior to passing it to the loader, who has his hand out-stretched in anticipation, as a well-drilled crew ought.

As the purpose-designed 8.8cm PaK43 L/71 was in constant demand, but lagging in production, an expedient was designed to supplement it in the field. By using the 8.8cm gun tube, a 10.5cm l.FH18 carriage, and wheels from the 15cm s.FH18, the 8.8cm PaK43/41 was created, as seen here in a display of ordnance. Note the hard-edged camouflage scheme based on Dunkelgelb RAL7028, neatly applied by brush. The spaced armor shields resembled those seen on the PaK40; just below them, in the folded position, is the forward travel lock for the gun tube.

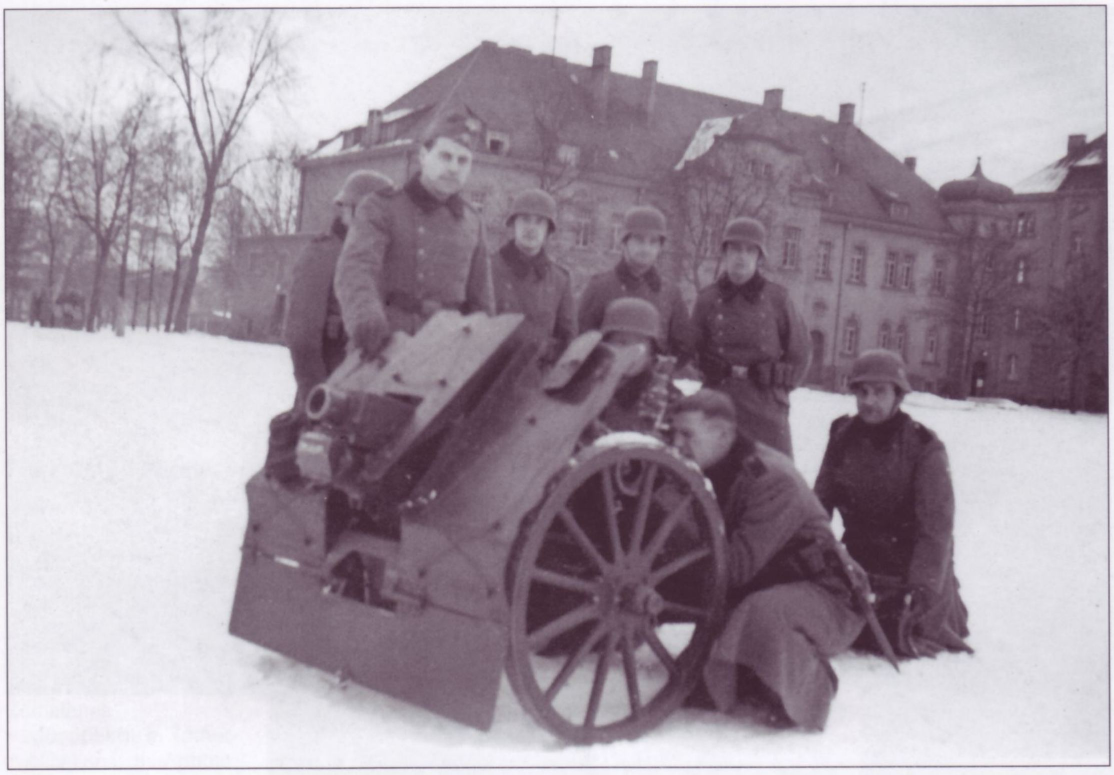




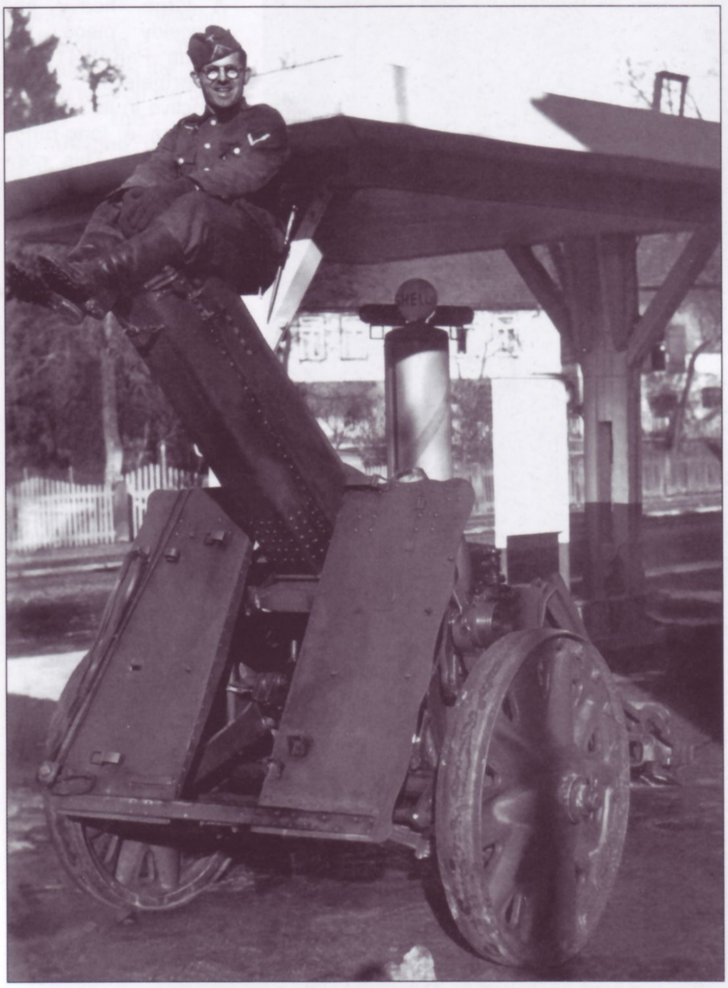
A large, heavy and unwieldy piece, the 8.8cm PaK43/41 was nevertheless quite effective in its intended role as a long-range tank killer. This crew has skillfully placed their piece at the edge of a small wood, where it can dominate the surrounding open terrain. Note also the spaced-armor nature of the gun shields, and the wide track of the piece's wheels.



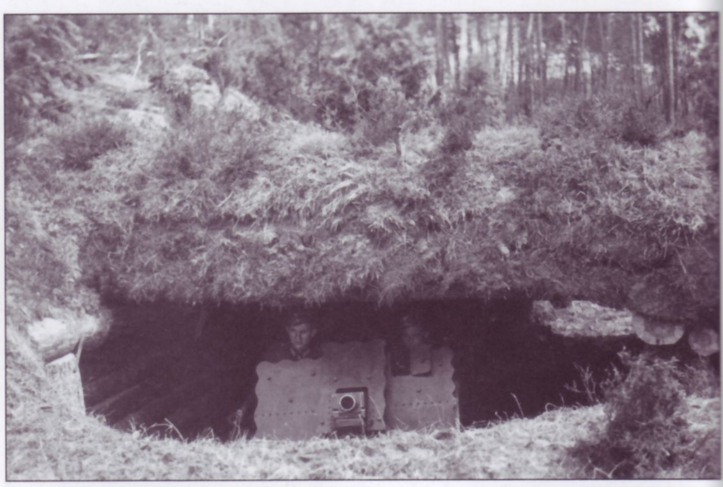
This pre-war photograph (note the three-tone feuersicherem Buntfarbenanstrich paint scheme visible on the gun's shield) shows a 7.5cm l.IG18 being hauled by a Krupp L2H143 (Kfz.69) tractor. Note the tactical symbol for a motorized infantry unit on the tractor's ammunition locker, the Heer (Army) registration plate below it, and the spare wheel rim for the gun in-between the two crewmen at rear.



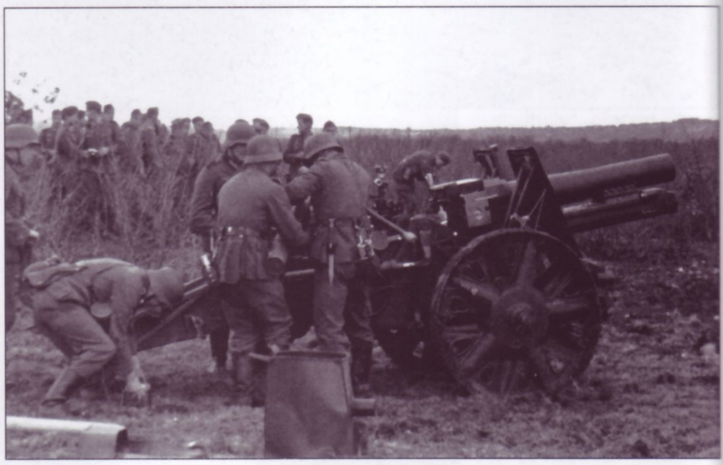
The crew of this 7.5cm I.IG18 poses with their piece against a snowy background. Note the wire running from the bolts that secured the spaced-armor shield in place; this was used to hold foliage in place to better conceal the gun during action. This gun mounts wooden spoke wheels, typical of a piece that was horse-drawn in an Infanterie-Division.



In a pose typical of many artillerymen the world over, this Heer soldier shows off his "big gun" in the form of a 15cm s.IG33. This gun is from an Infanterie-Division as can be seen by the cast steel wheels with metal rims; it also lacks the brake lamp seen on the lower part of the shield, which typified guns towed by motorized means.

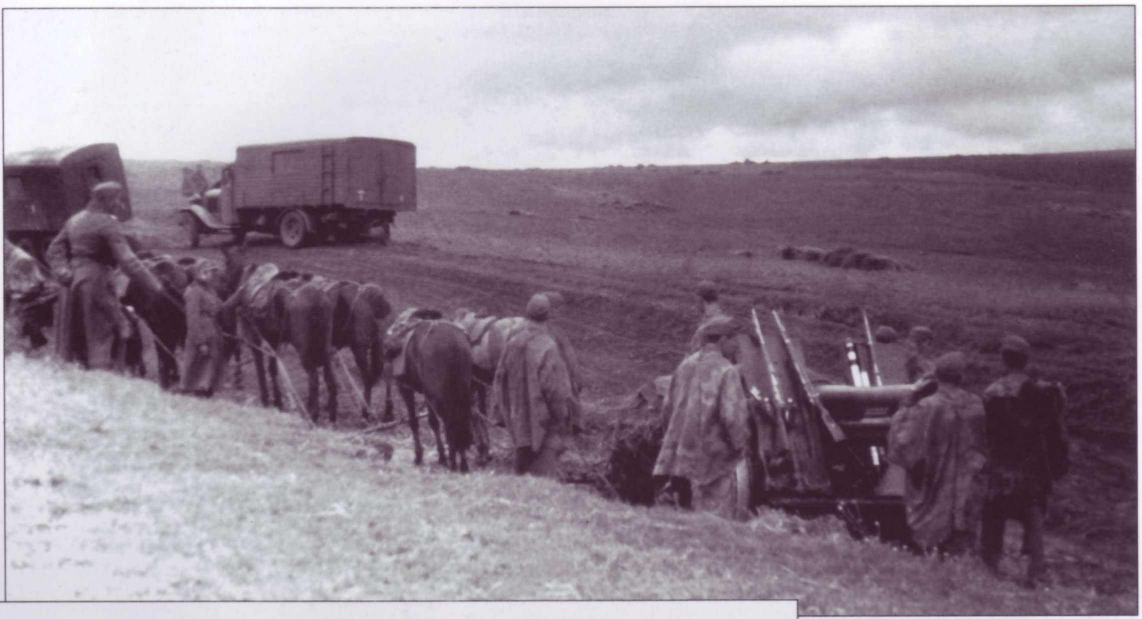


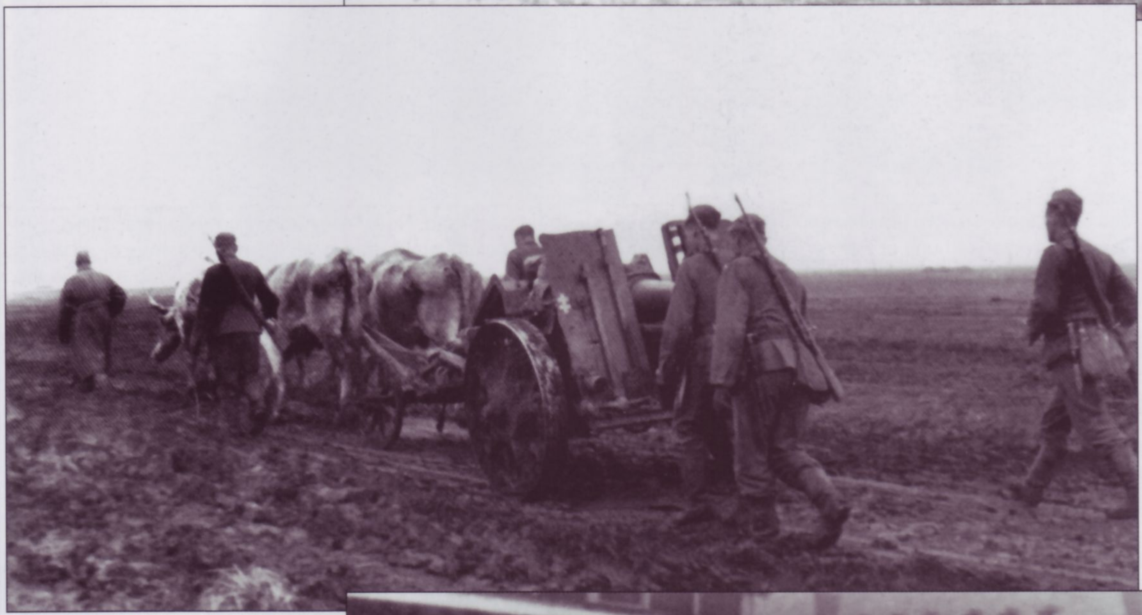
When the situation allowed for it, German troops would often "make themselves at home" by constructing rather elaborate field works as seen here. Two crew-members assigned to this 7.5cm I.IG18 peer out from their earth and log bunker. They have carefully covered the position with sod, which will help better conceal them from the prying eyes of the enemy.



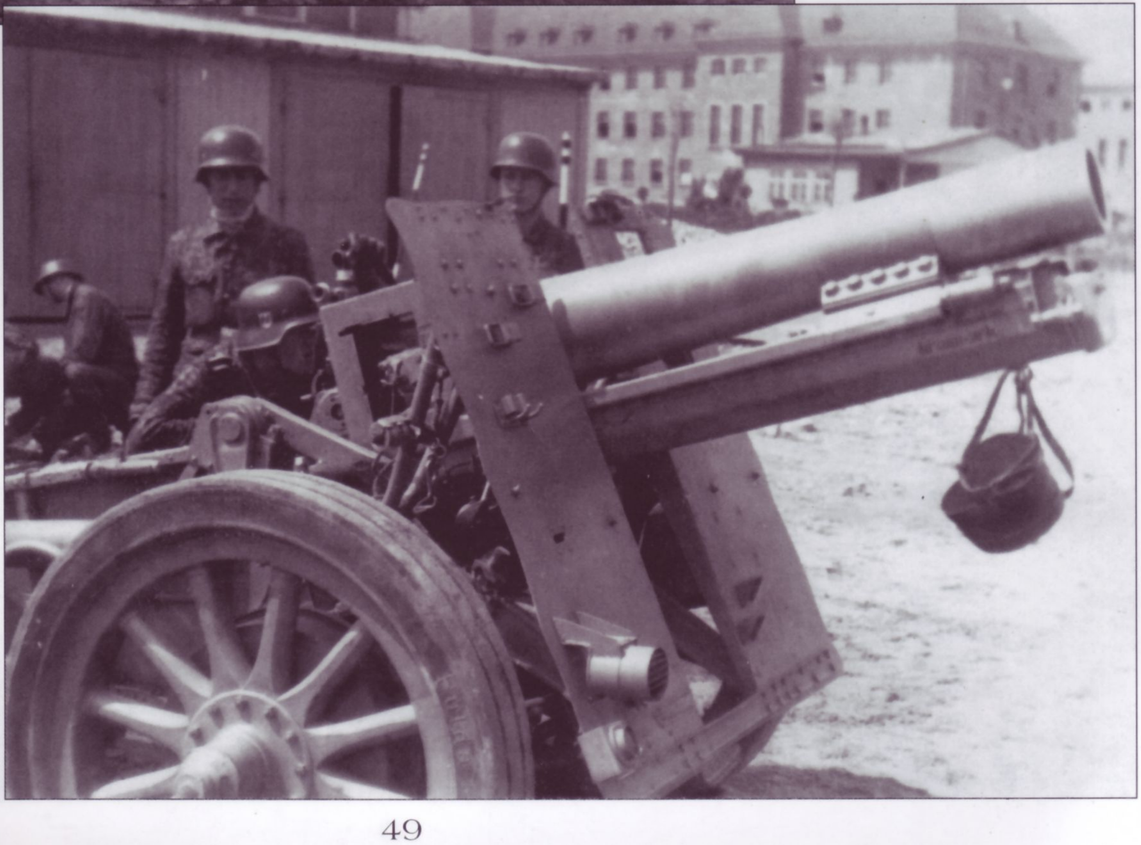
Another group of infantrymen prepare to fire their 15cm s.IG33 while being observed by the crowd in the background; the casual appearance of everyone suggests that this is a training session. The wheels are the cast type with steel rims associated with a horse-drawn gun.

This group of Heer (Army) soldiers (note their "splinter-patterned" Zeltbahn shelter quarters being worn as rain capes) prepares to move their 15cm s.IG33 behind six horses. As they do not have a limber to raise the piece's box trails clear of the earth, this may prove to be an overly difficult task. Note the twin-cross insignia of the 79. or 169.Infanterie-Division, just visible to the left of the two Kar98k rifles hanging from the gun shields.

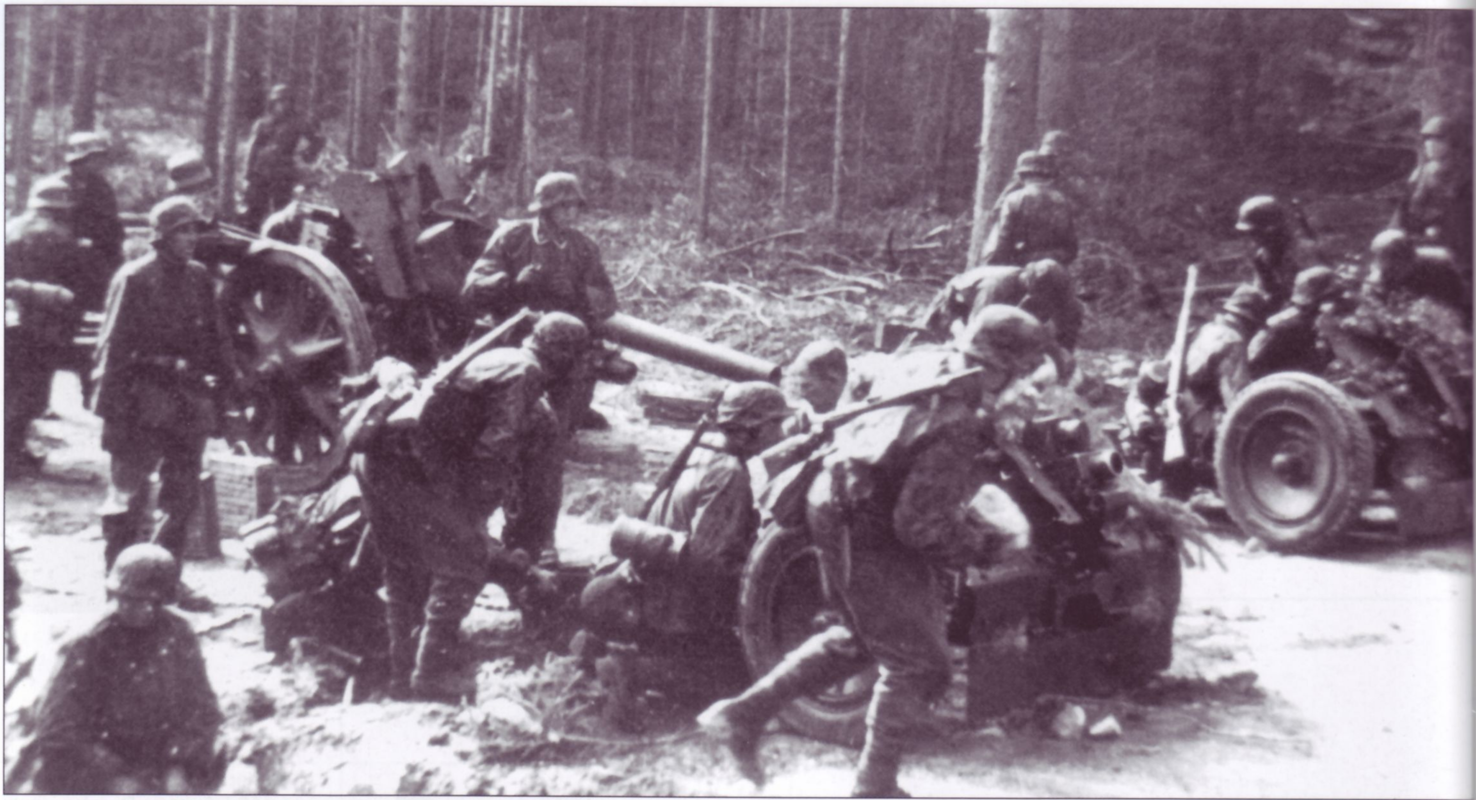




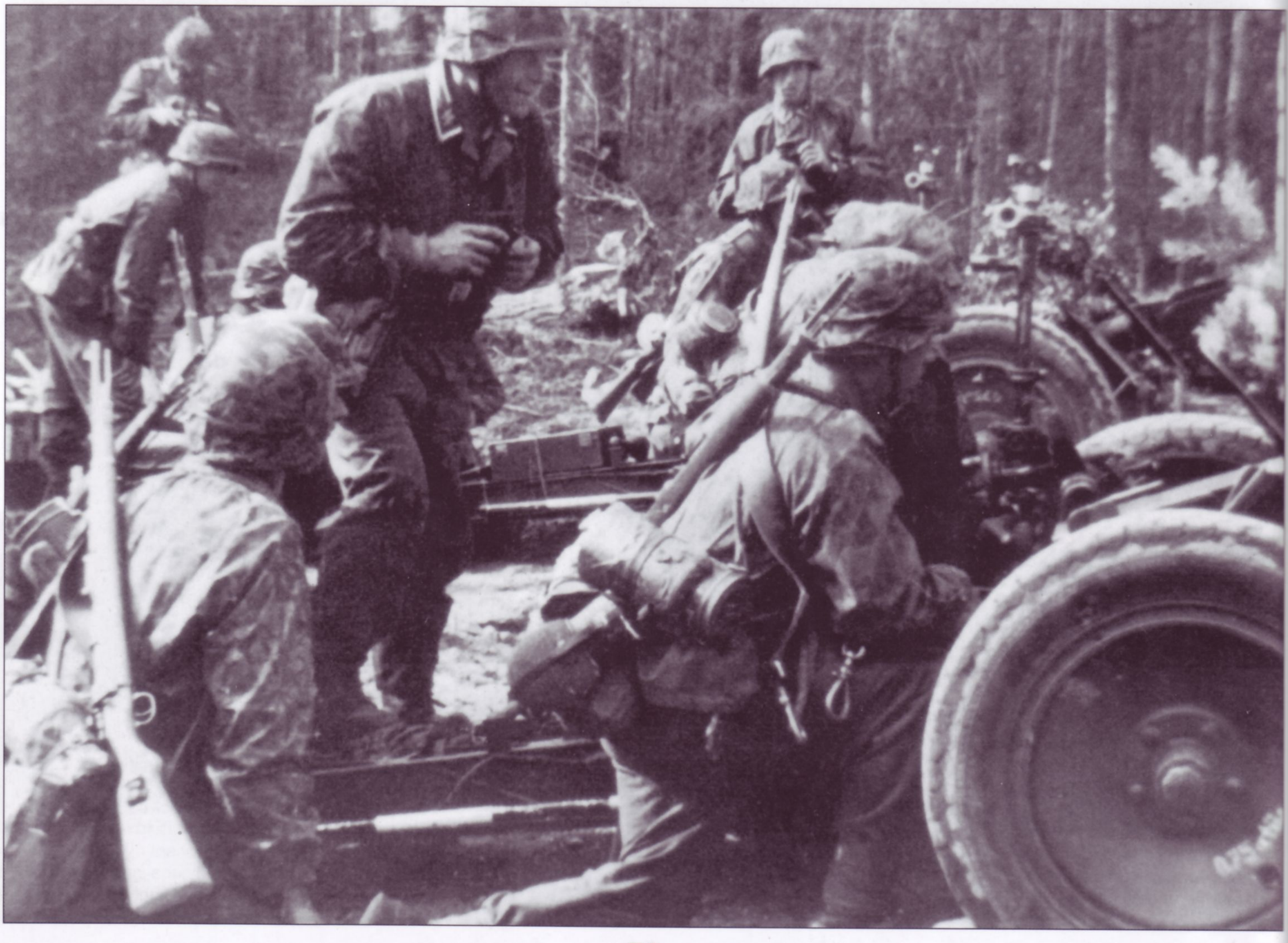
Another gun crew from the 79. or 169.Infanterie-Division (note the division's insignia on the left of the gun shield) has found a more efficient, if somewhat improvised means to move their 15cm s.IG33. They have procured local oxen to pull the gun and a part of a farm wagon to create a makeshift limber.

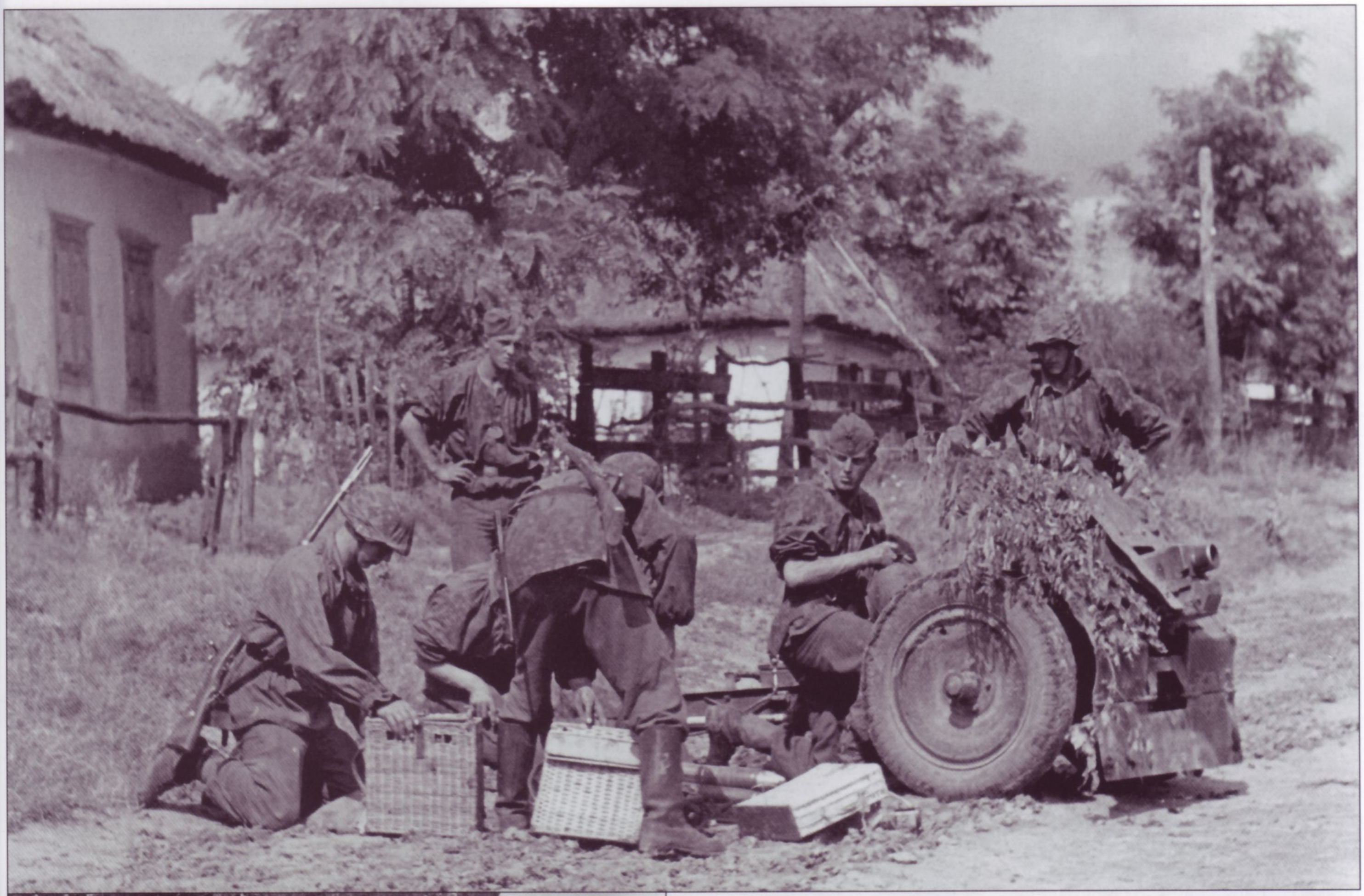


Seen in the post-February 1943 era, these members of the Waffen-SS work on their 15cm s.IG33, probably during training. Note that the gun is finished in Dunkelgelb RAL 7028 and that there is a canvas muzzle cover hanging from a strap below the gun tube. This piece is also configured for motorized transport as can be seen by the spoked, rubber-rimmed wheels and the electric brake lamp attached to the shield with a bracket.

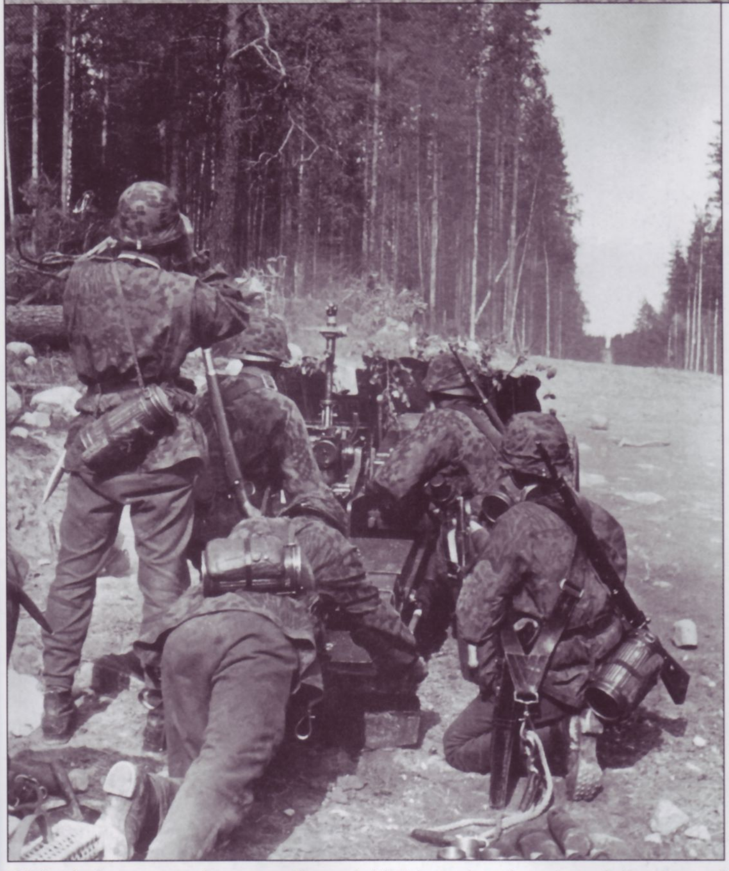


The crews of two 7.5cm l.IG18s, as well as a single 10.5cm l.FH18 prepare a hasty defense along a forest road. Note the pneumatic rubber tires fitted to the infantry guns, suggesting that they are from a motorized unit or Panzer-Division. The camouflaged helmet covers and smocks worn by the troops, as well as their collar tabs, identify them as members of a Waffen-SS unit. Note also that in their typically aggressive manner, the troops are preparing to move their guns up in order to meet the enemy head-on. In the second photo, the wheel hub has a legend applied, indicating the tire pressure to be maintained.

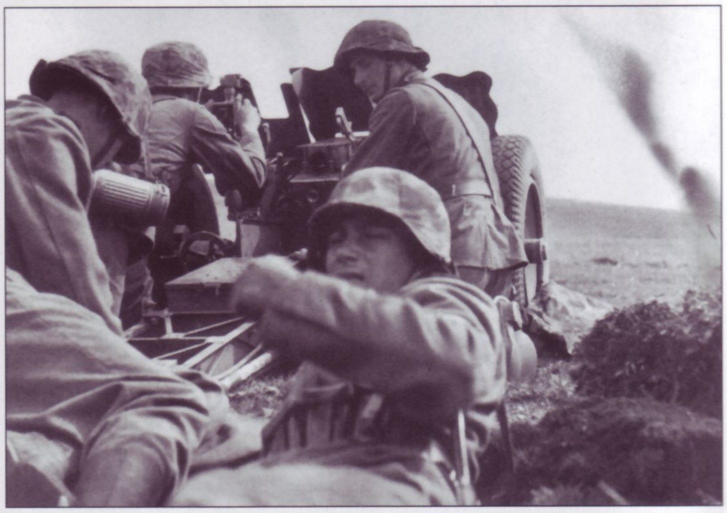




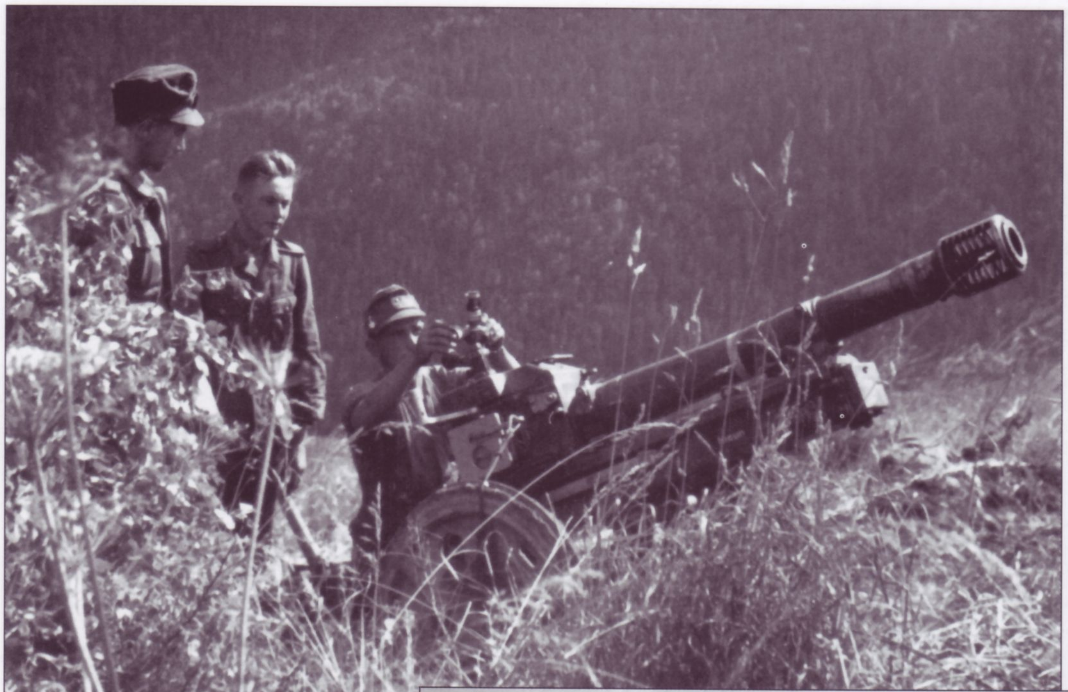
Another Waffen-SS crew calmly prepares their 7.5cm l.IG18 for action, somewhere on the Ostfront. Ammunition for these guns was carried in steel, wood or, as in this case, wicker containers. This crew has also fastened local foliage to their piece to better help conceal it.



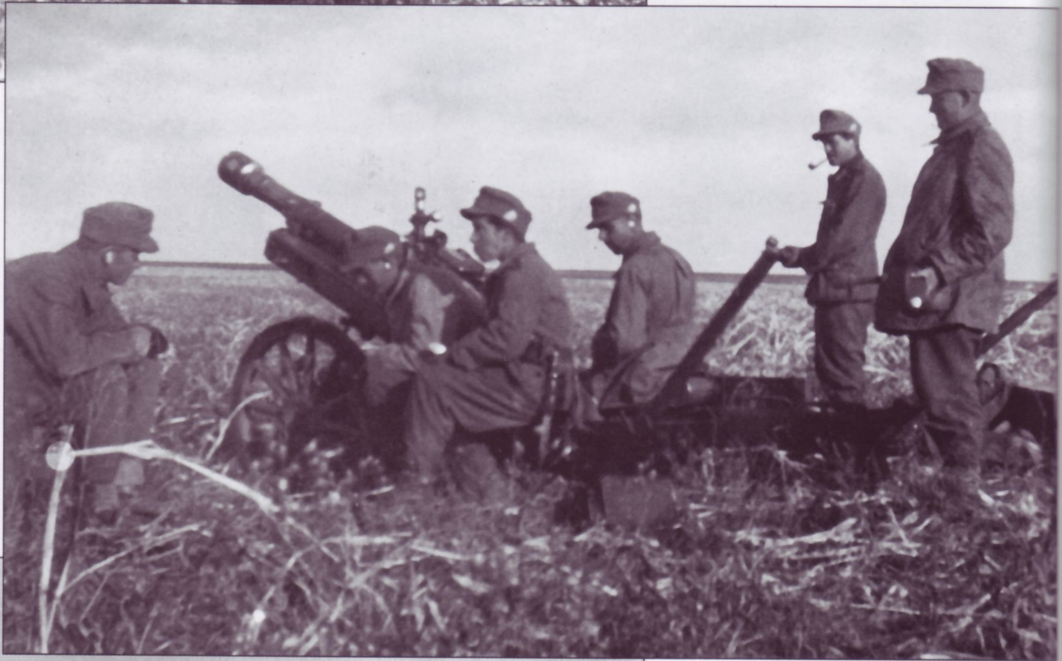
While their commander gazes through his binoculars for a target, the crew of this 7.5cm l.IG18 prepares for the order to fire. Note the man in the foreground with the unenviable task of steadying the piece since in their haste the crew has not had time to emplace the earth spade at the rear end of the box trails. Their uniforms also identify these men as members of the Waffen-SS.



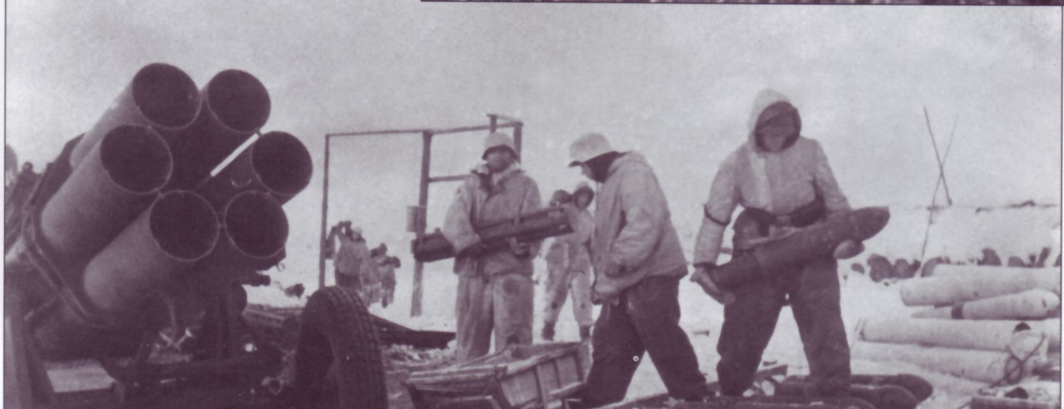
While the gunner makes some adjustments to his sight, the remaining members of this 7.5cm l.IG18s crew huddle behind the gun's shields for protection. It would also appear that some attempt has been made at digging in, but that imminent action has prevented the men from completing that task.



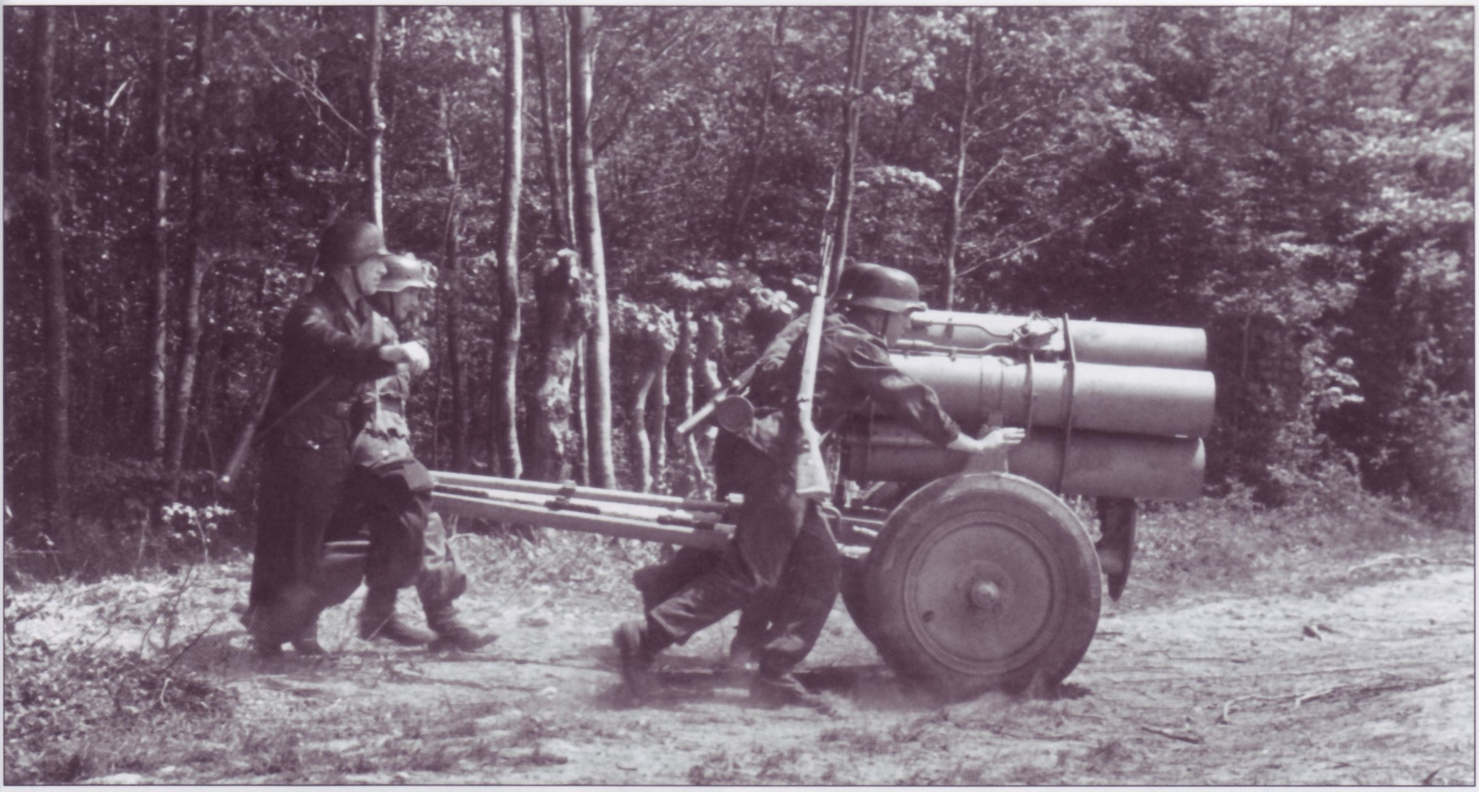
In an absolutely stunning natural setting, the gunner of this 7.5cm GebG36 adjusts his sights as he prepares his piece for battle. Note the compact design of the piece and its slotted muzzle brake; it could be broken down into components and carried in eight loads by mules.



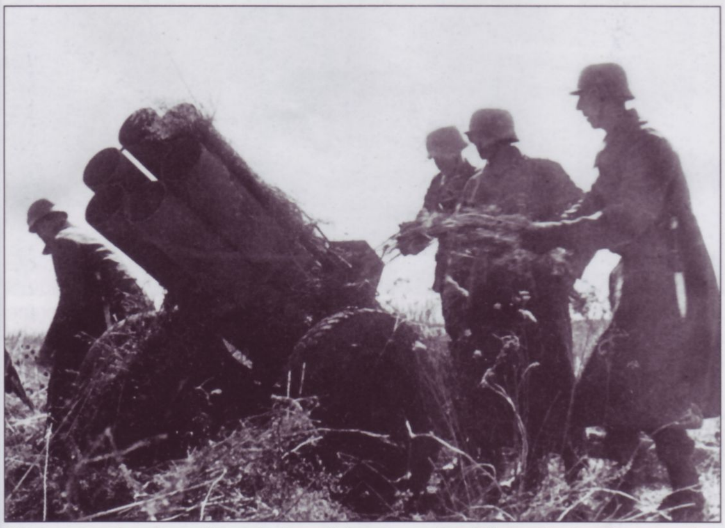
Wearing the distinctive Edelweiss insignia on their characteristic Bergmütz peaked caps, this Gebirgsjäger (mountain troops) gun crew rests between fire missions. Their 7.5cm GebG36 mounts one of several styles of wheels, in this case, traditional wood-spoke types.



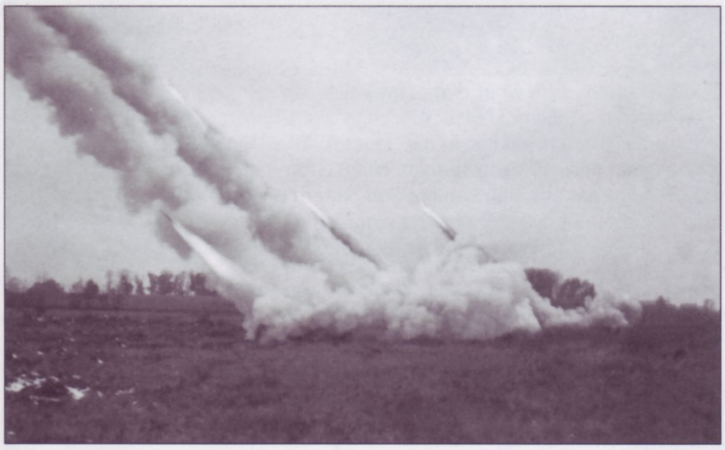
Members of the crew of this 15cm NbW41 prepare for a fire mission somewhere on the frozen Ostfront. One man cradles a rocket (which could weigh up to 35.48kg) in his arms, while another brings up what may be a rocket body without its warhead in a wood slat container. Note the wire running from upper left to the lower right foreground in this photograph; this is the firing cable which led from the launcher to a remote detonator. This battery's weapons positions appear to be rather static and well-used, suggesting that this unit has not felt the need to rapidly displace after each salvo, as was usually the case.



Having only five, instead of the six launch tubes seen on its smaller cousin, this 21cm NbW42 is pushed across a forest track by its crewmembers. The astute observer will note that the wheel and tire arrangement on this carriage matches that of several other German cars, trailers, half-tracks and guns; at least in some cases, there was standardization!

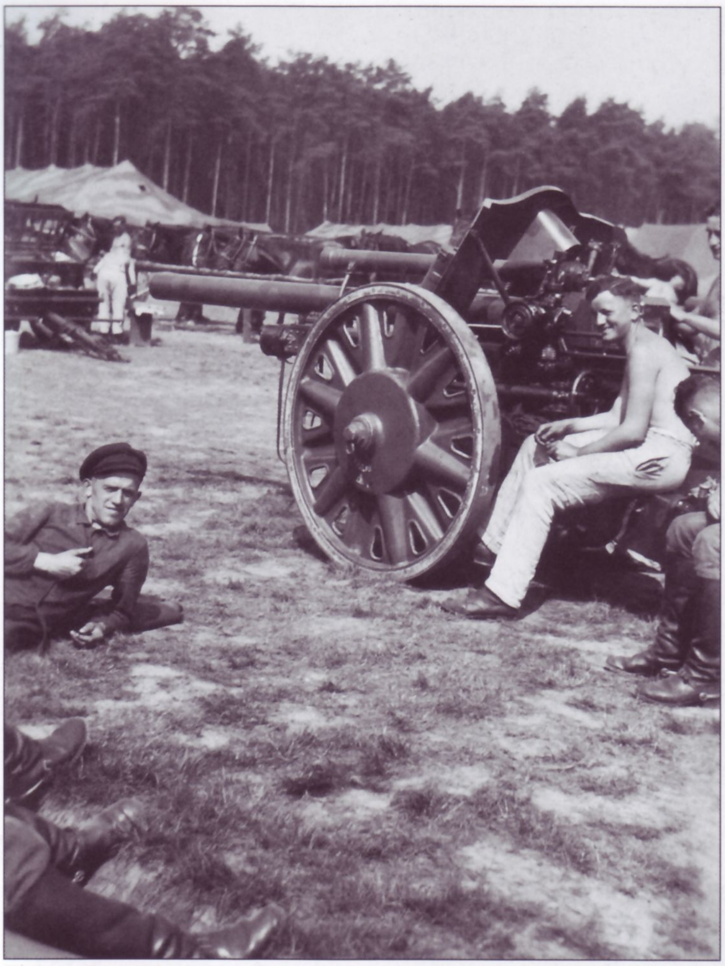


After preparing for a fire mission, this group of soldiers pile local vegetation on top of their 15cm NbW41 to conceal the launcher until the time for its use arrives. The box shape on the launcher covered the electrical junction box to which the remote firing cable was attached.

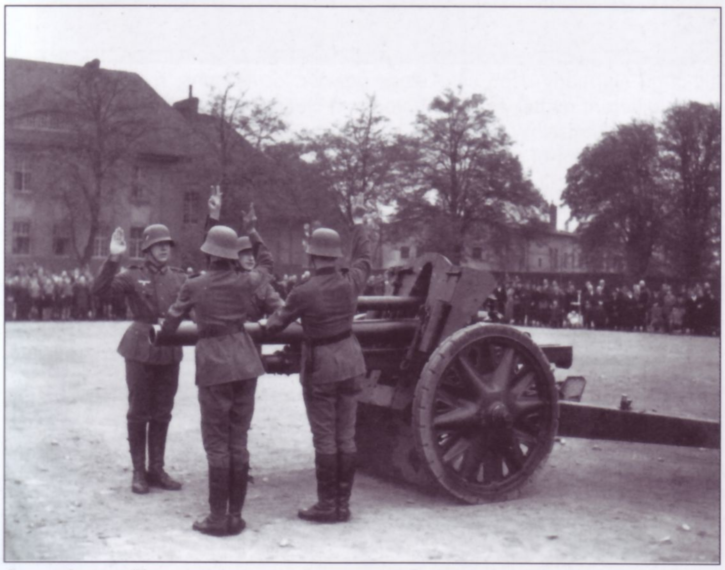


Although Germany used smokeless powder for its guns, rocket propellant was a different matter as this photograph clearly shows. What is possibly a battery of 15cm NbW41s fires a ripple salvo; note the three rockets just leaving the tubes of three different launchers simultaneously, following the smoke trail of the previous three rockets. When all of this ordnance lands down-range, it will devastate the area of the intended target.

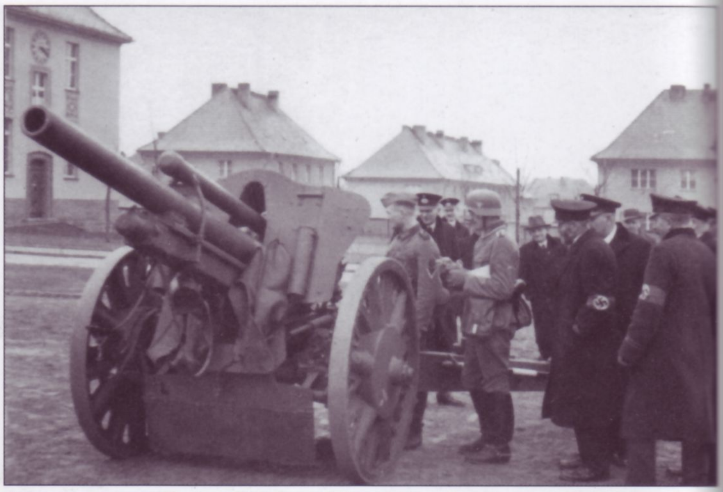
At least four 30cm NbW42 launch units are firing a volley at enemy concentrations. The launch unit consisted of six launch frames for the rockets, mounted in two stacked horizontal banks of three, on a modified Sd.Ah.52 limber. This configuration is barely apparent in this photograph allowing for positive identification of type. Curiously, although obviously of a different type, these rockets are not emitting the huge clouds of exhaust smoke as seen in a previous image.



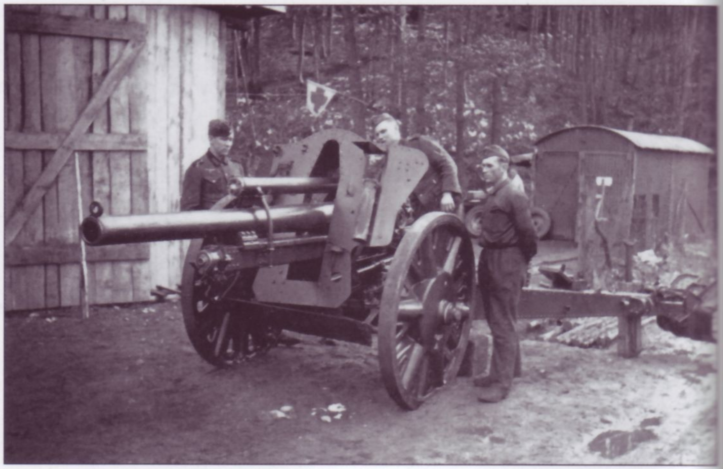
Taking a break from what is most certainly a pre-war training exercise, the crew of this 10.5cm l.FH18 enjoys a light moment. This immaculately maintained piece is painted in the “feuersicherem Buntfarbenanstrich” three-tone system of Nr.17 Erdgelb-matt, Nr.28 Grün-matt and Nr.18 Braun-matt in a hard-edge pattern. The camouflage pattern is easily apparent on the gun tube, recuperator cylinder and the inner fairing on the Schutzschild (splinter shields). Note that the pattern is also seen on the canvas tents in the far background.



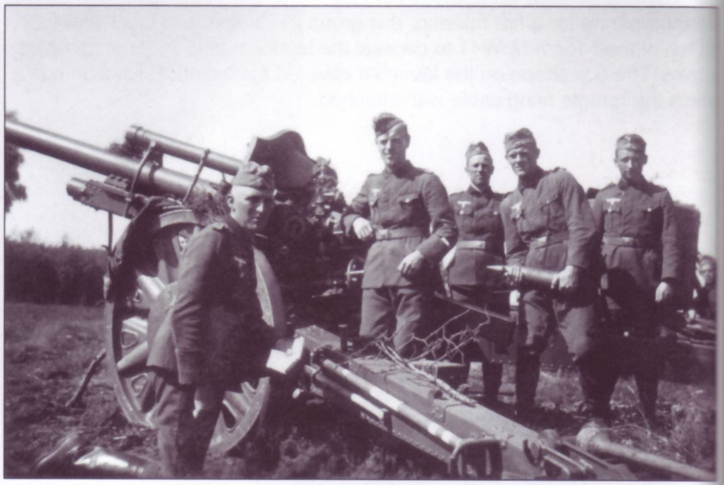
A combat unit's weapons are its reason for being. It is a typical military tradition for soldiers to swear an oath upon these weapons before their comrades and their families, as is being done with this 10.5cm l.FH18. This howitzer is configured for mechanized transport as can be seen by the mounting of cast wheel hubs (of a different style than seen in previous photographs) with rubber rims.



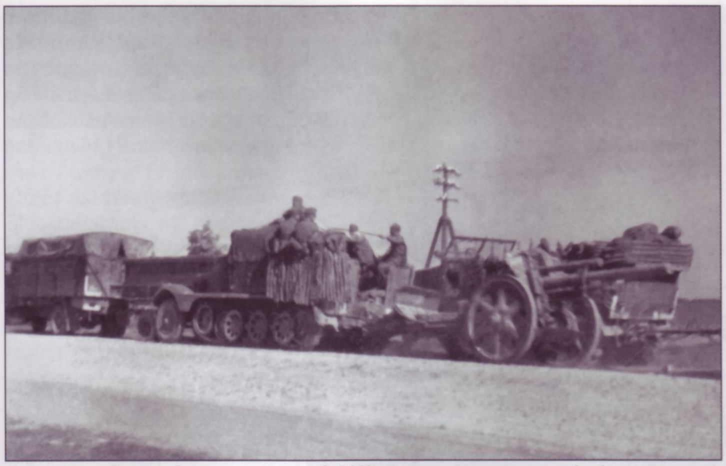
A group of Nazi Party officials and Heer (Army) officers examine a pristine 10.5cm l.FH18 at a local Kaserne (barracks/camp), probably in the pre-war era. The howitzer's cast wheels have steel rims, and there is no electric brake lamp on the lower segment of the Schutzschild (splinter shields), indicating that this piece belongs to an Infanterie-Division and is drawn by horses. Note also the canvas breech cover and the weatherproof cap that covered the piece's muzzle during travel, hanging on the shields.



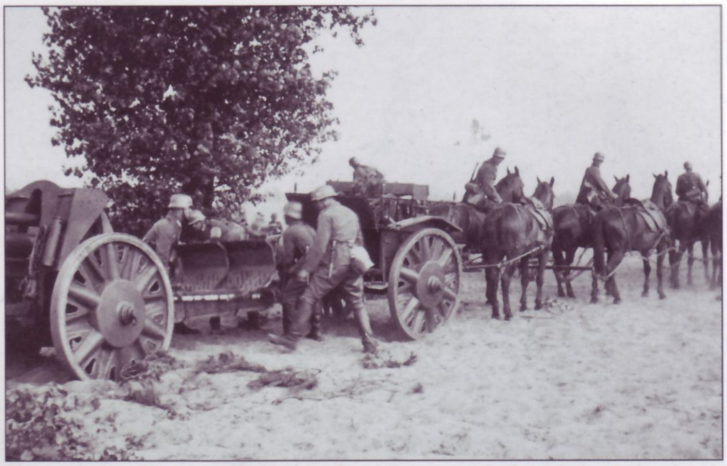
The unusual, propped-up attitude of this 10.5cm l.FH18, as well as the doughnut-shaped device on the muzzle may indicate that this howitzer is being “bore-sighted” (having its sights properly aligned with the gun tube). Note the simple, riveted construction of the box-section split trail legs. The cast hub/steel rim wheel and lack of an electric brake lamp, indicates that this piece was used by a horse-mobile Artillerie-Regiment of a Heer Infanterie-Division.



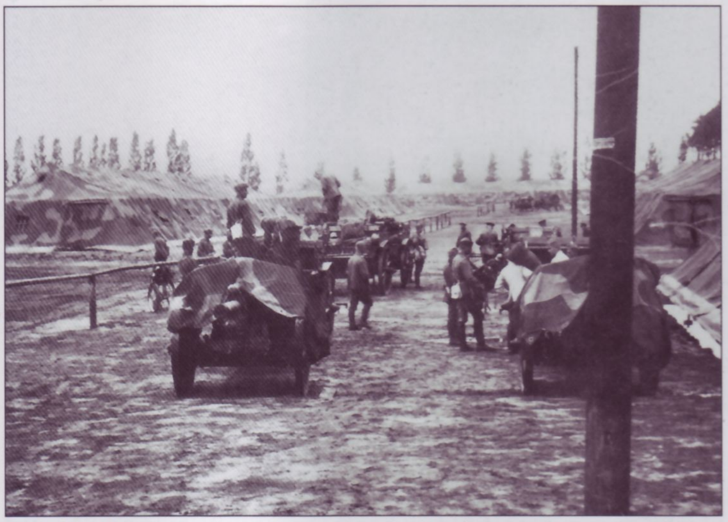
A group of Heer (Army) cannoniers pose with their 10.5cm l.FH18. Note the striped aiming stake on the trail leg in the foreground, the man holding a projectile (the howitzer fired a “separate loading”, or two-part round) and the wheel style configured for horse-mobile batteries.



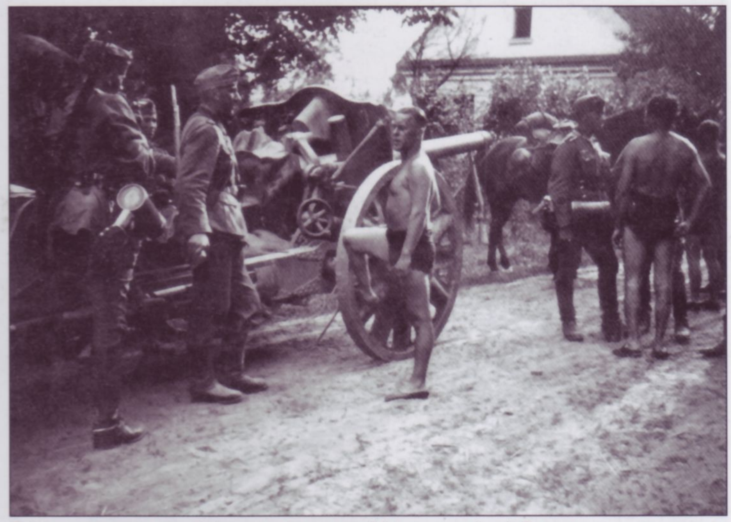
A leichter Zugkraftwagen 3-ton Sd.Kfz.11 moves at speed along a road, hauling a 10.5cm l.FH18 configured for motorized transport. Note the wheel/tire combination and the barely discernable electric brake lamp, on the lower left side of the Schutzschild (splinter shields), just above the folding segment. Note how the latter is folded up for travel, allowing for proper clearance.



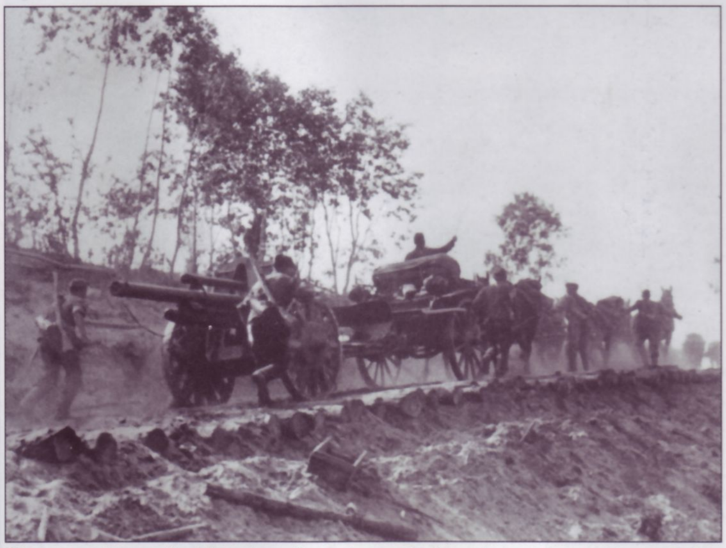
The majority of the guns fielded by Germany were designed also to be drawn by horses, as seen here. This 10.5cm l.FH18 is attached to a limber, with the whole being moved by six horses; note the wheel configuration of both the howitzer and the limber. Note also the relatively large size of the earth spades at the tips of the trail legs, which are folded up and forwards for travel.



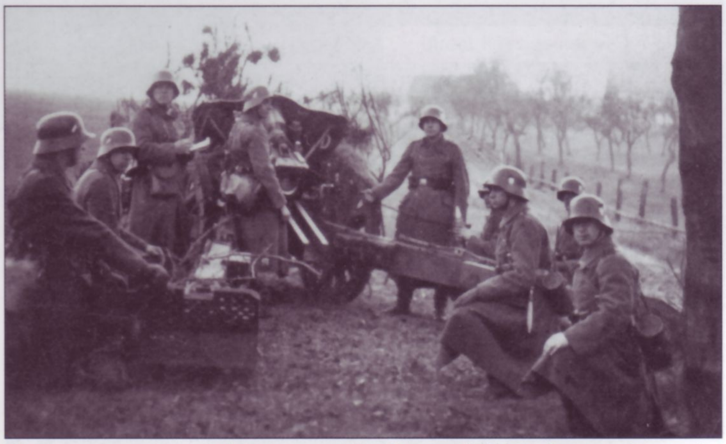
Probably the most interesting parts of this photograph are the distinct camouflage patterns printed on the canvas gun covers and the tents that surround this line-up of horse-drawn 10.5cm l.FH18s. The horses have been un-hitched and the howitzers have been left still attached to their limbers, in this pre-war camp setting.



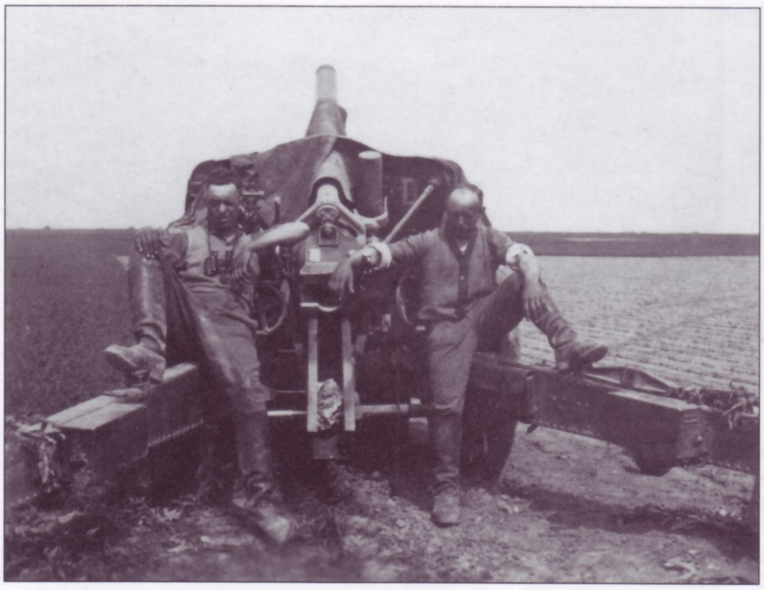
Taking advantage of the weather conditions, a pair of German troops greets their comrades wearing nothing but athletic shorts. The10.5cm l.FH18 is still in travel mode (note the piece's attitude and the folded-up earth spades on the trail legs) and remains attached to its limber, which is off-camera.



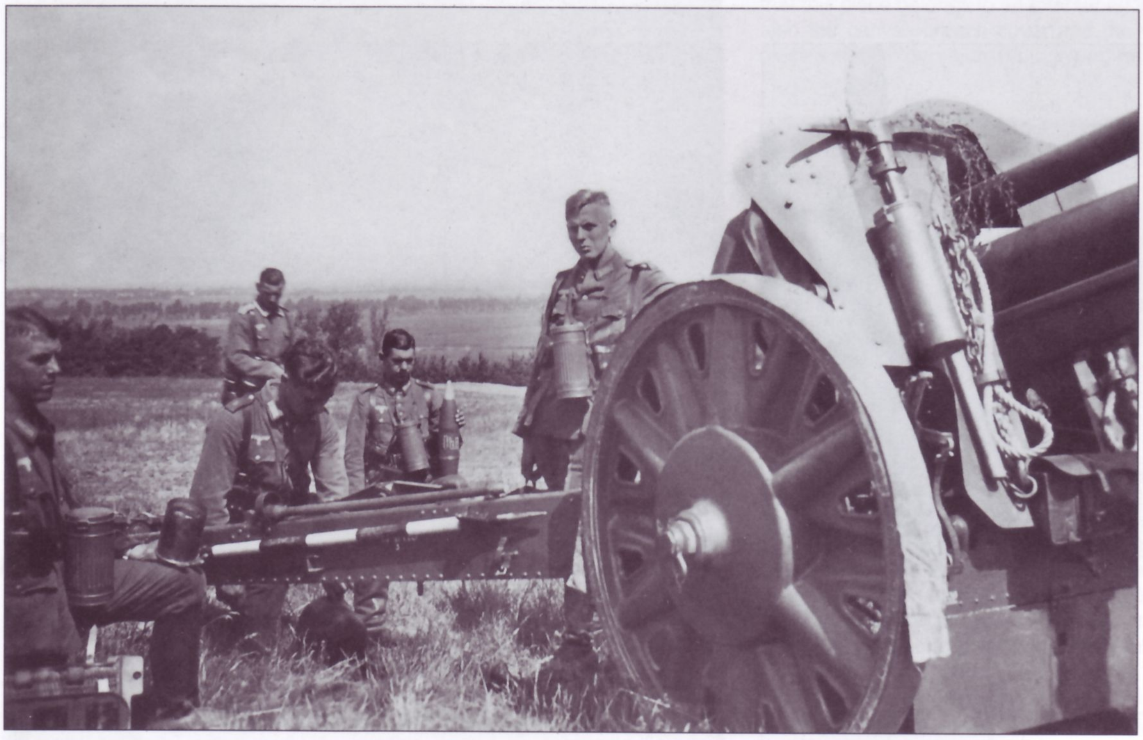
The use of so-called "corduroy" roads made from logs, as seen here, helps heavy equipment such as this horse-drawn 10.5cm l.FH18 negotiate soft ground. Note that on this incline, only the teamster is riding; the remainder of the crew, including the three men who normally rode the left-hand horses, are all on the ground, struggling to get their howitzer to its next destination.



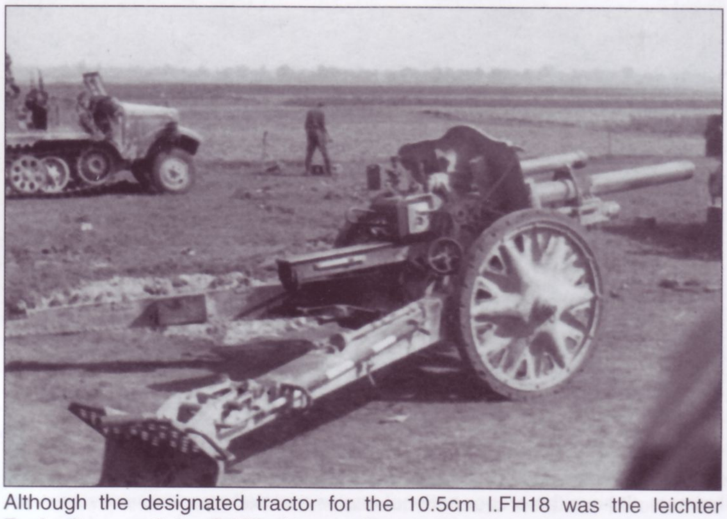
The crew members belonging to this 10.5cm l.FH18 all wear the earlier M1916 steel helmets, a strong indicator that this photograph was created very early in the formation of Hitler's new Wehrmacht (German Armed Forces; the term is often confused to mean simply "army"). Note that their helmets all have the proper national eagles and Wehrmacht shields on each side. The howitzer has been placed (but has not had its spades dug-in) and has had its outline distorted by the use of foliage. Note that although no ammunition is anywhere in evidence, the gunner grasps the firing lanyard in his hand, as if the piece is loaded and ready to fire.



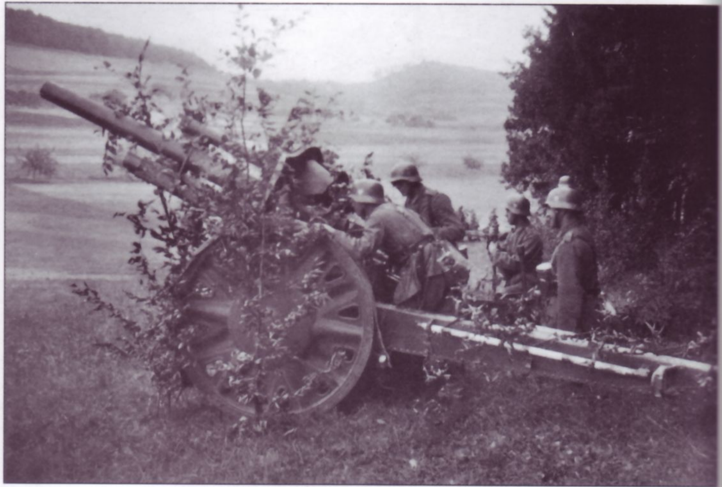
A pair of bedraggled artillerymen pose on the trail legs of their 10.5cm l.FH18; the man at left with binoculars is most likely the crew's commander. The howitzer has had its trails spread apart, and propped up on blocks, which explains why they parallel the surface of the surrounding earth. Note the gun-in-battery letter, "D", on the inner surface of the Schutzschild (splinter shields); also visible are details of the breech and recuperator mechanisms.



One peculiarity of artillerymen's dress was the need for them to wear their M1938 gas mask containers hanging over their chests; this was so they could mount their horses and sit on the limber during movement, without the need for time-wasting "adjustments". The man at left holds the charge case, while the kneeling man at center holds the projectile; note also the various items stowed on the Schutzschild (splinter shields) of this 10.5cm l.FH18. A curiosity is the strip of cloth laying on the steel wheel rim; it may possibly be there to mask the reflection that worn rims might transmit to an observant enemy.

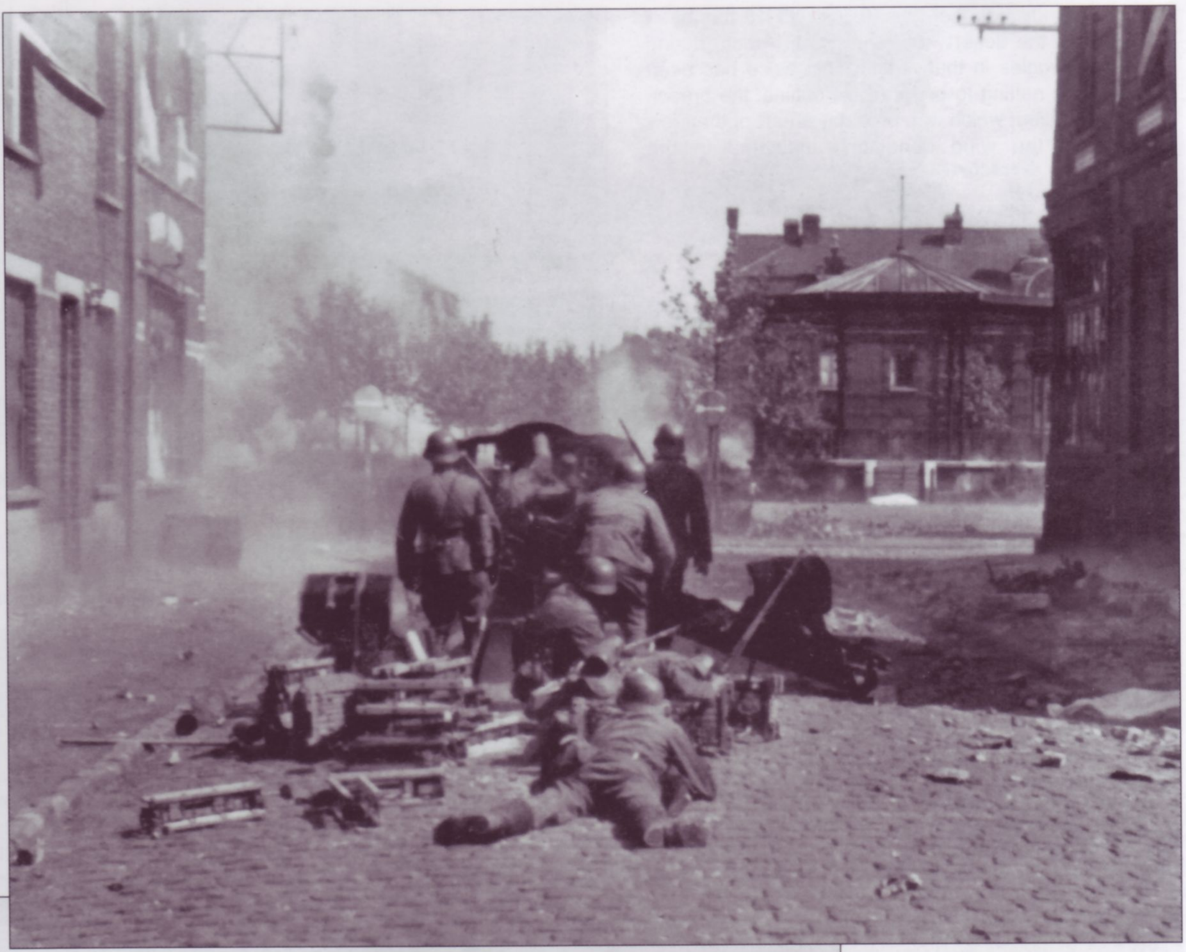


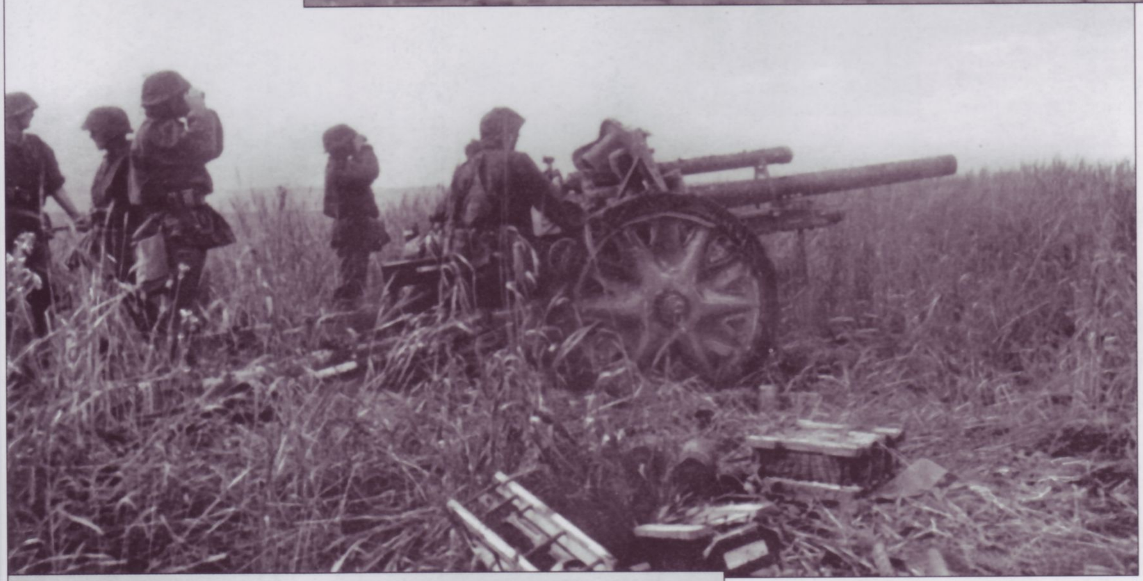
Although the designated tractor for the 10.5cm l.FH18 was the leichter Zugkraftwagen 3-ton Sd.Kfz.11, an often-used substitute was the mittlerer Zugkraftwagen 5-ton Sd.Kfz.6, as seen here in the background. The very dusty howitzer has cast wheels with rubber rims, which are the proper configuration for a piece pulled by motor vehicles.



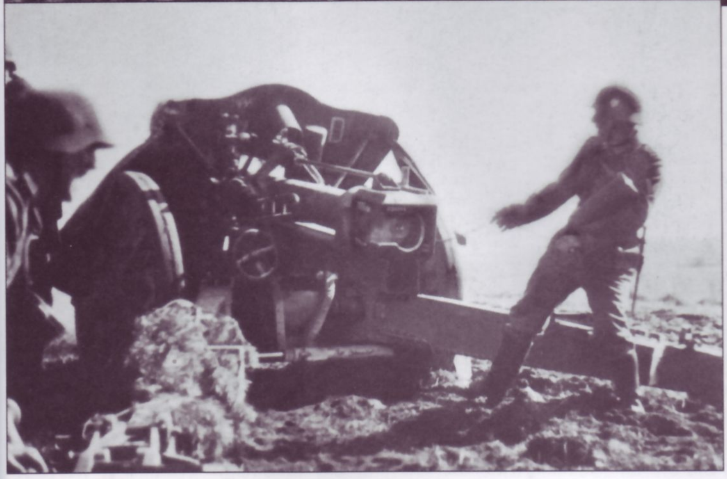
This crew has set their 10.5cm l.FH18 at the very edge of a tree-line, hoping to use it and the foliage attached to their piece for maximum cover during their fire mission. They have dug in the earth spades, a sure indication that their howitzer will be fired, during what is probably a training session.

German combat doctrine stressed flexibility and aggressive use of all available assets during an assault. Here the crew of a 10.5cm l.FH18 has exposed their howitzer on an urban street as they engage line-of-sight targets; the huddled attitude of the men on the pavement, as they "make themselves small", indicates the situation is rather serious. Note the discarded wood-slat packing crates; these held the projectile, while the larger cases held the charge for the separate loading round. Note that the earth spades are folded up on the trail legs, which must have made the firing of the howitzer quite an adventure for the crew.



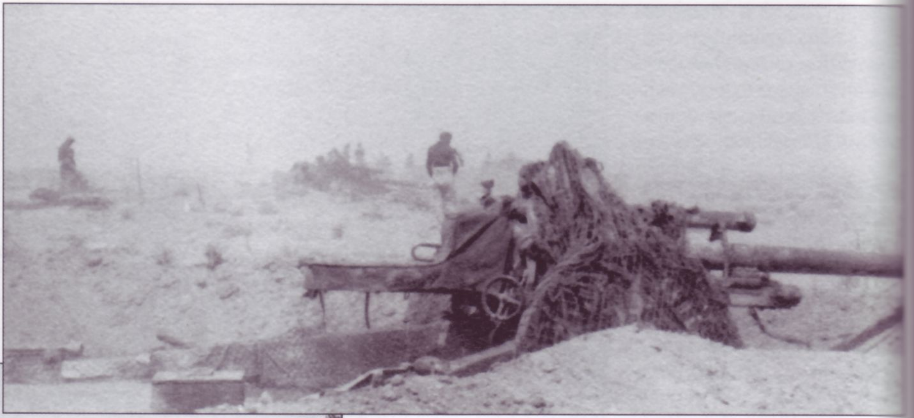


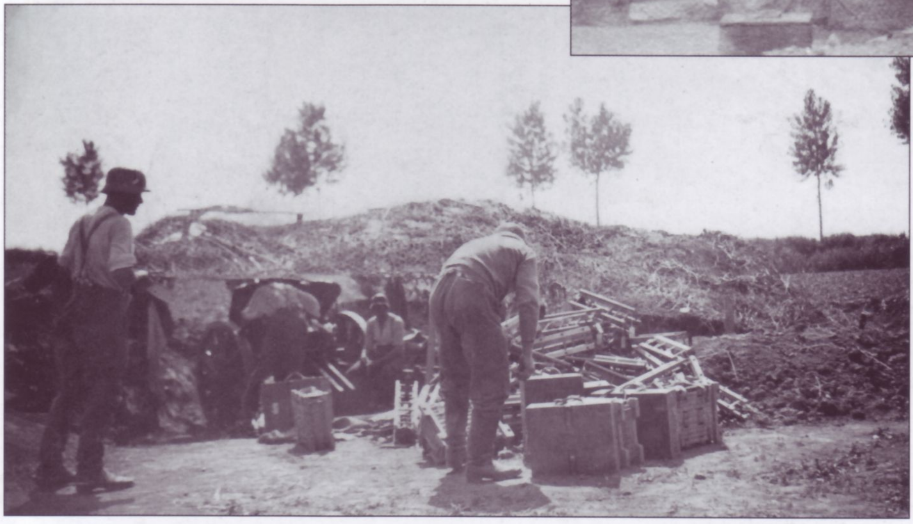
This 10.5cm l.FH18 mounts cast wheels with rubber rims, indicating that it is optimized for towing behind a motor vehicle. The gun crew is engaging in direct fire against a line-of-sight target; note the two men observing the fall of shot through their binoculars. Scattered in the foreground are the various shipping containers for the piece's ammunition.



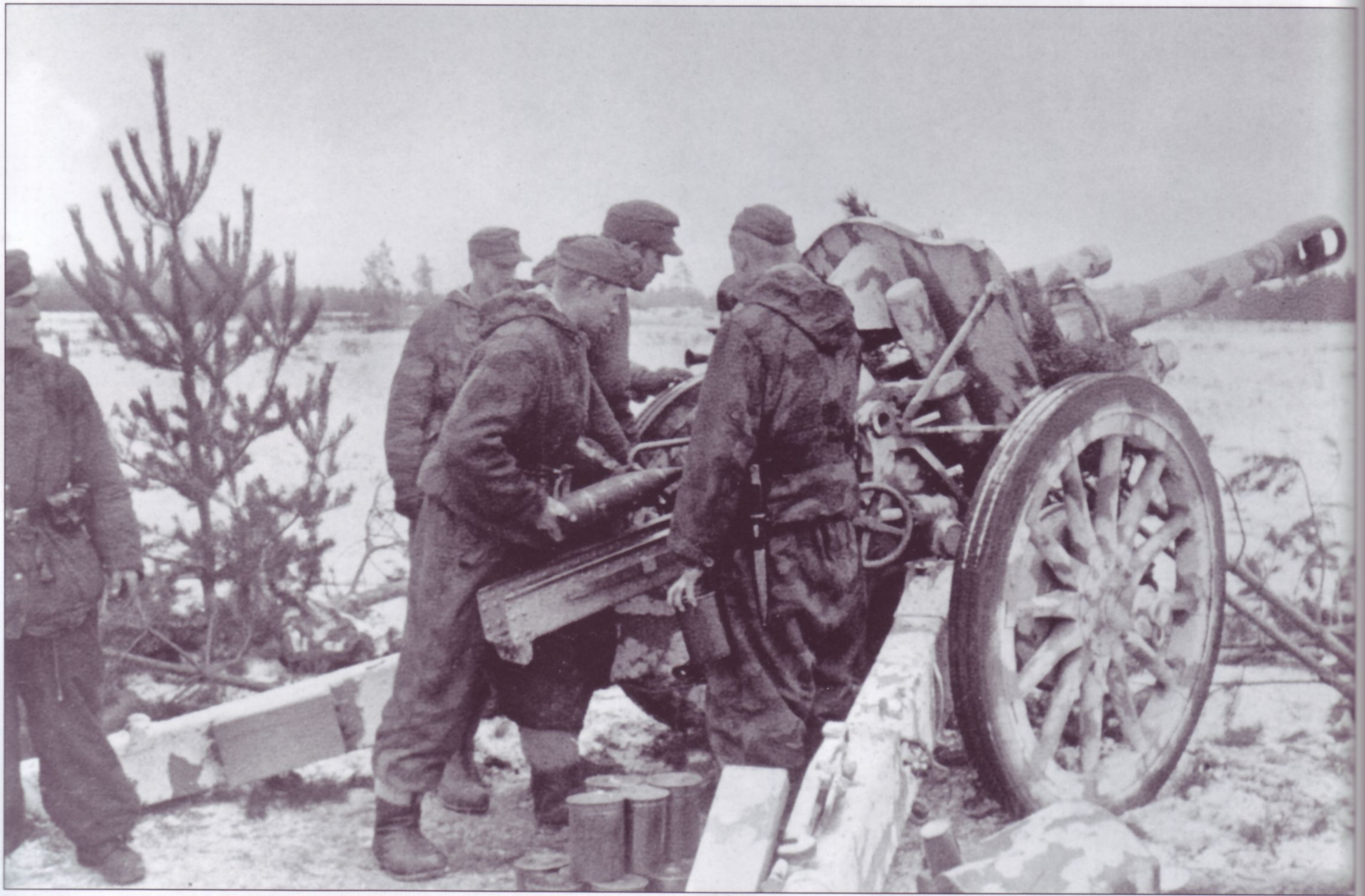
The photographer has caught this 10.5cm l.FH18 in full recoil as the piece sends a round towards the enemy. The piece is shooting at a rather flat trajectory, suggesting that the intended target is close and being engaged in a "direct fire" mode. Note the gun-in-battery letter, "D", on the inner face of the Schutzschild (splinter shields), and the canvas tarp hung on the outer face to break up the piece's outline.

The terrain indicates that this 10.5cm l.FH18 has been emplaced in the desert wastes of North Africa, during the epic struggles in that region. This piece has been covered with netting to break up its outline; the breech cover is installed, which was probably smart of the crew considering the wind conditions indicated in the photograph.

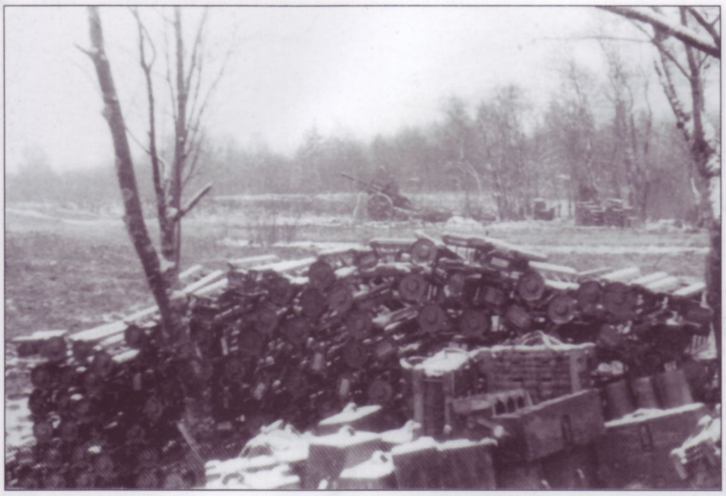




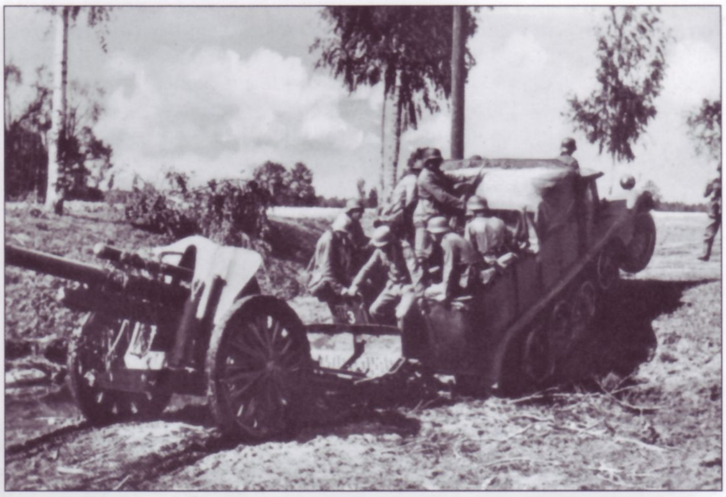
The crew of this 10.5cm l.FH18 has settled in for the duration; note the dug-in piece, hidden under netting and what appears to be a structure at far left. At far right, is a heap of empty wood slat packing containers for the projectiles, with the cases that held the charges just below them in the photograph. Everyone's casual attitude and the debris at right indicate that some recent work has been done with their howitzer.



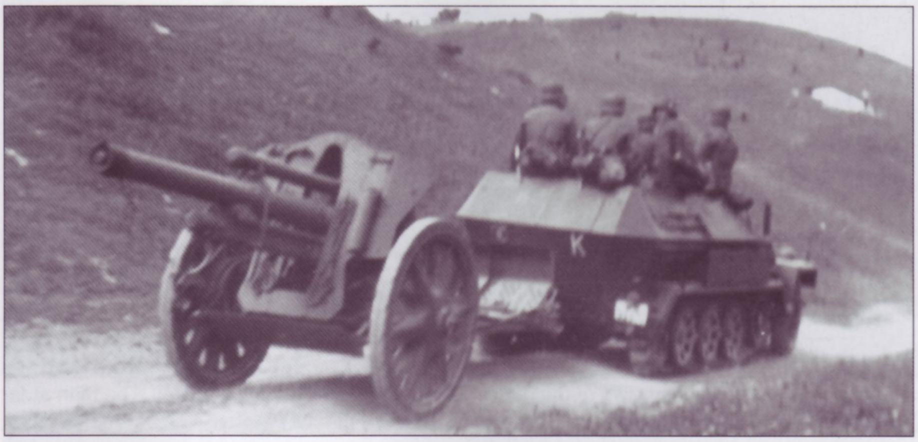
In order to increase the range of a round fired by the 10.5cm l.FH18, it was modified to accept a "Mundungbremse" (muzzle brake), and designated 10.5cm l.FH18M. The increased range was obtained by enlarging the powder charge; the recoil forces thus generated required the use of a muzzle brake to help dissipate them. Note also the style of wheel seen on this howitzer, which was another version designed for when this piece of ordnance was hauled by a motor vehicle.



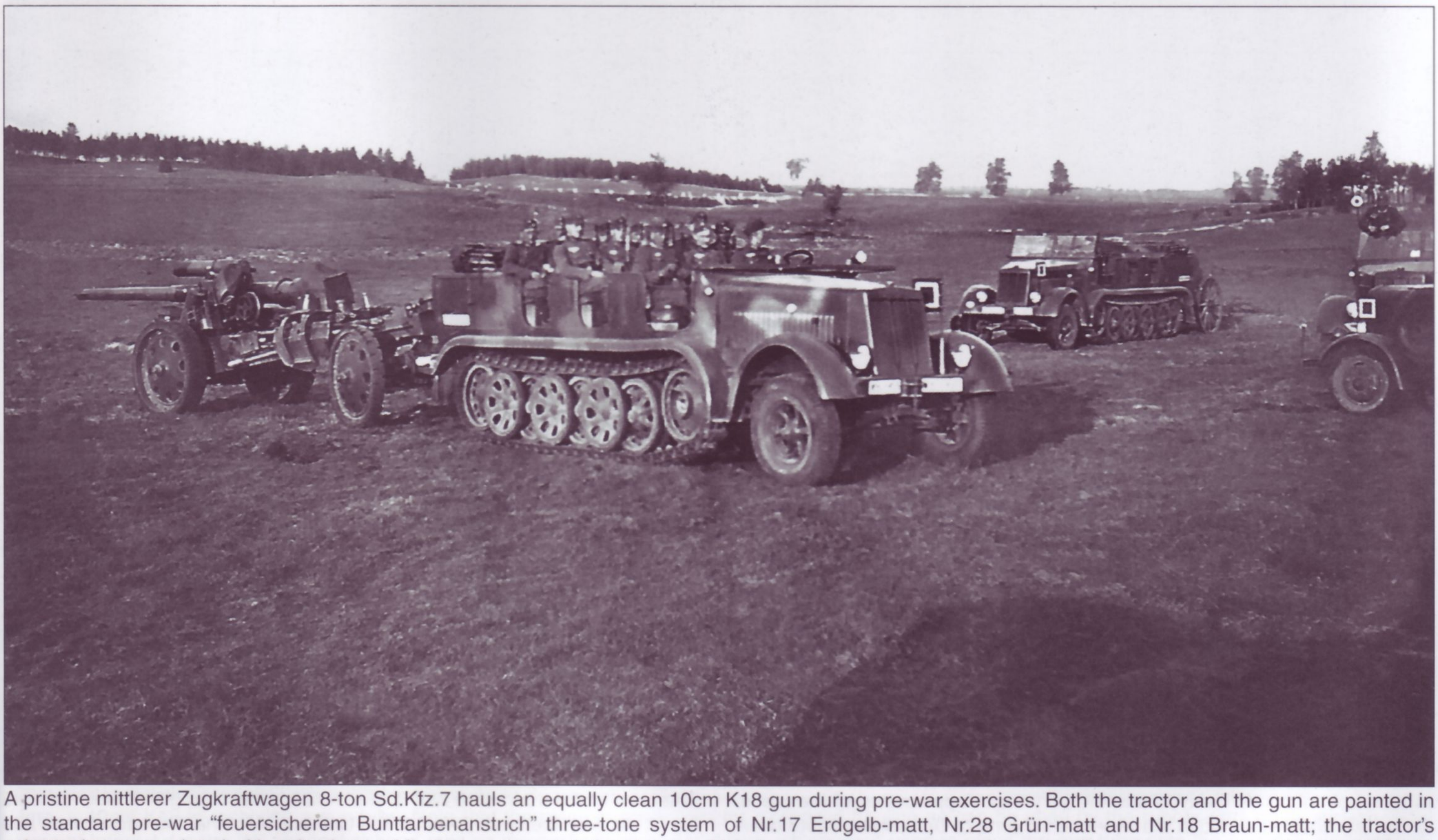
Contemporary breech-loading artillery, such as the 10.5cm l.FH18, used ammunition at a prodigious rate. This is attested to in this photograph by the mounds of ammunition packing materials seen both in the foreground, and to the rear of the gun in the background.



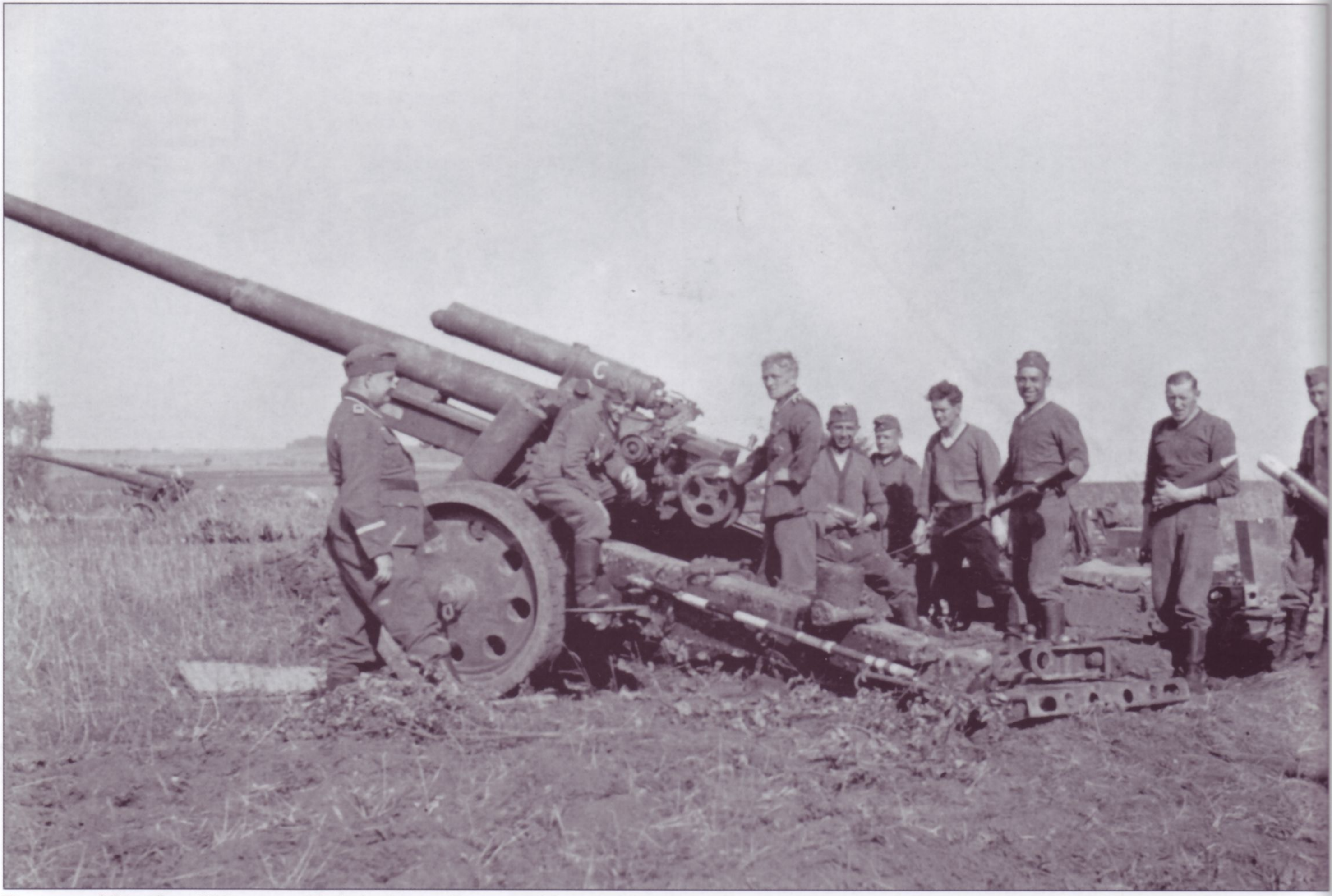
Hauled by its leichter Zugkraftwagen 3-ton Sd.Kfz.11 tractor, this 10.5cm l.FH18 is just about to negotiate a ditch on its way to the front. It appears that some retouching was carried out on the original photograph; note the wheels on both the howitzer and the tractor.



An alternate means of hauling the 10.5cm l.FH18, particularly with a few of the early Panzer-Divisionen, was the mittlerer Schützenpanzerwagon Sd.Kfz.251, in this case with an Ausf.A body style. Although the Sd.Kfz.251/4 was optimized to haul the 7.5cm l.IG18, there was no specific version of this armored half-track designed to haul the 10.5cm l.FH18. The white "K" on the rear of the m.SPW shows it as belonging to Panzer-Gruppe von Kleist, which during the 1940 French campaign, had the 1., 2., 6., 8. and 10.Panzer-Divisionen attached; one of these units is the likely owner of this howitzer and tractor.



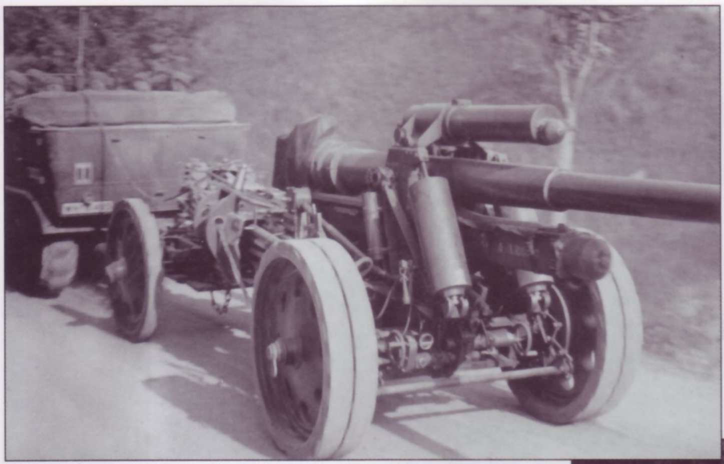
A pristine mittlerer Zugkraftwagen 8-ton Sd.Kfz.7 hauls an equally clean 10cm K18 gun during pre-war exercises. Both the tractor and the gun are painted in the standard pre-war "feuersicherem Buntfarbenanstrich" three-tone system of Nr.17 Erdgelb-matt, Nr.28 Grün-matt and Nr.18 Braun-matt; the tractor's scheme is spray-painted with soft edges, while that on the gun is hand-painted leaving hard edges between the colors. Note that the tractor (it has the KMm11 body style) displays registration plates in the standard positions for the era and that there is also a pennant on the far fender.



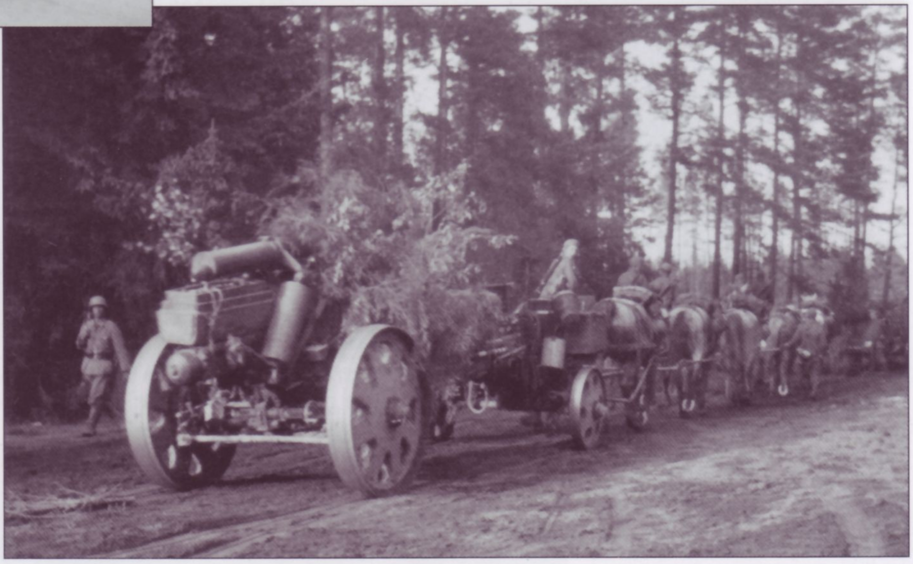
The crew of this 10cm K18 poses with their piece, with many of them holding projectiles; two of the men in the center hold the ramming staff. The man at far left is the "Speiss" or senior-most NCO (note his cuff-bands). The surest way of differentiating the 10cm K18 from the 15cm s.FH18 is the gun tube, which on the K18 is longer and thinner; note also the gun-in-battery letter, "C", on the recuperator cylinder. The earth spades have been fitted to the ends of the trail legs and have been dug-in to properly absorb and transmit the piece's recoil forces.

This 10cm K18 has been set up as expedient coast artillery, probably somewhere on the French Atlantic seaboard. Again note the long, thin gun tube, which identifies the type and the very clean appearance of the piece, which is probably painted in the two-tone scheme of Dunkelgrau Nr.46 over-sprayed with Dunkelbraun Nr.45 in patches, so the latter color covered roughly 1/3 of the item being painted.

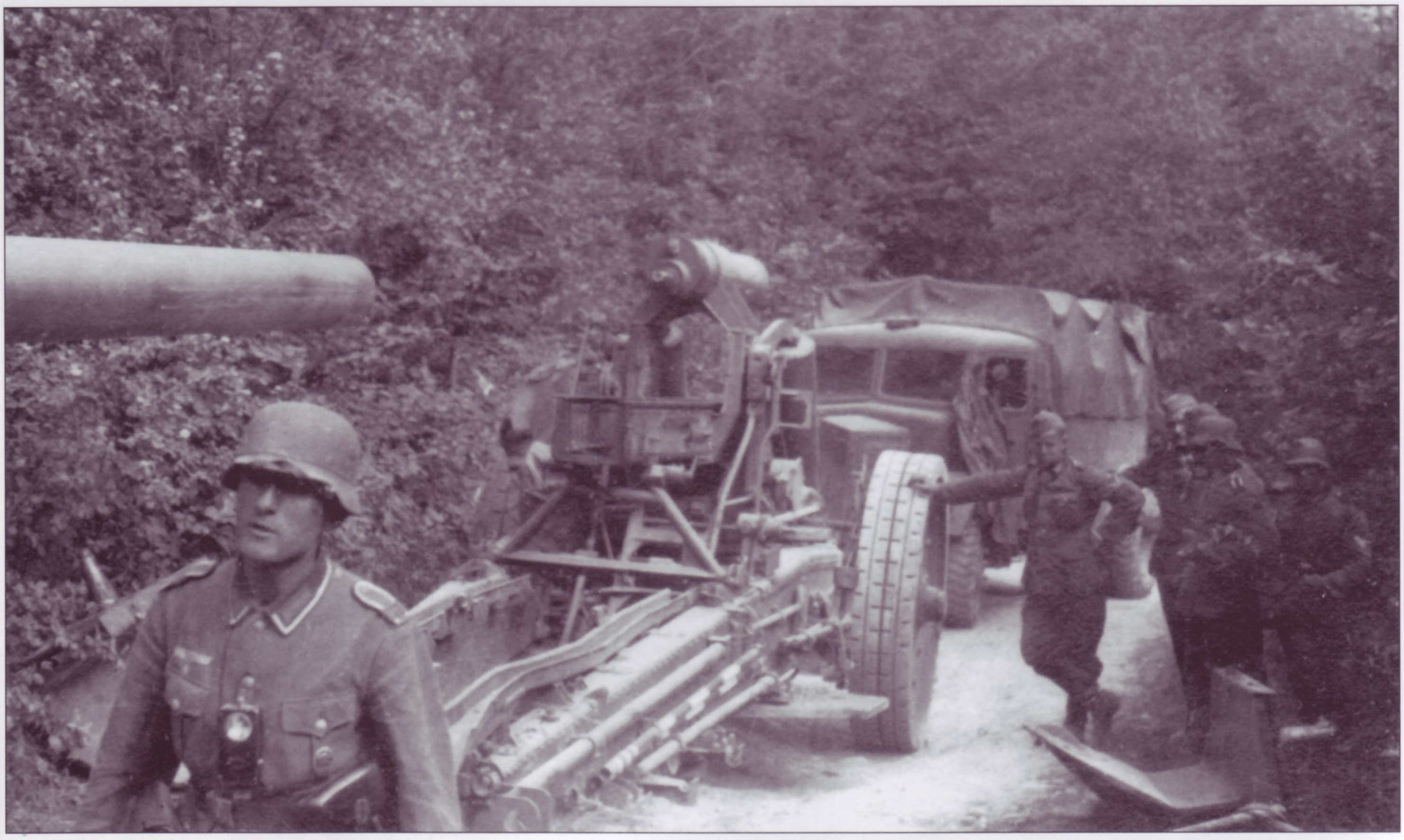
The crew of this 10cm K18 has spread netting over their gun to help conceal it a bit more on the open terrain of the Ostfront. Note that the earth spade has been properly dug in and there is large hand-spike protruding from the trail leg. The latter item was used to re-position the piece.



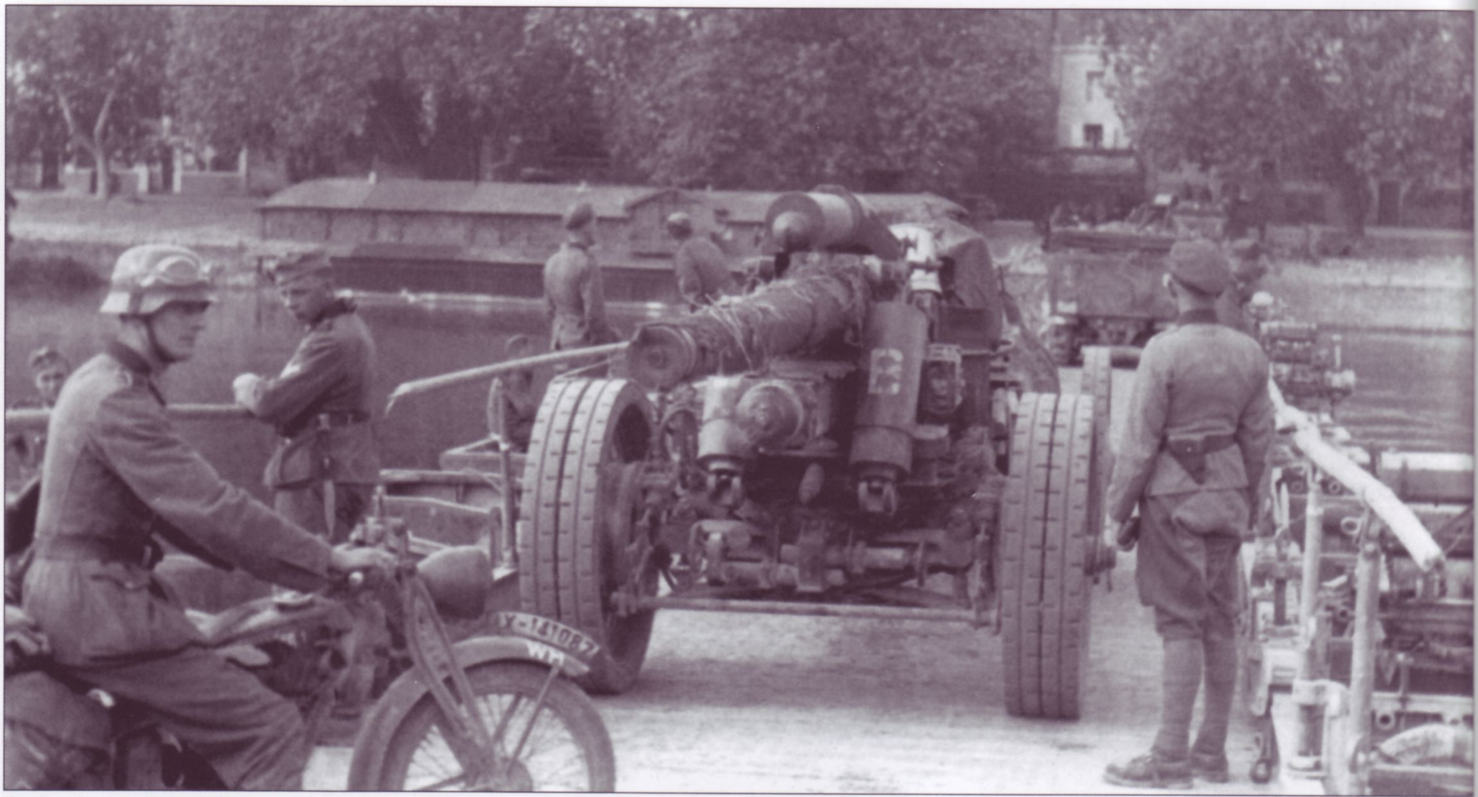
Moving at speed behind its mittlerer Zugkraftwagen 8-ton Sd.Kfz.7 tractor, this 10cm K18 exhibits some interesting features. Note how the gun tube has been run back on the recoil slide to shorten the entire unit and shift its center-of-gravity; this made it easier to haul the piece in confined areas. The tractor has a tactical marking for a motorized artillery unit, while the gun has a legend (unfortunately blurred by the motion) that seems to read, "4/A…"; this is the battery and regiment identification and was sometimes seen on larger guns and their tractors, especially earlier in the war.



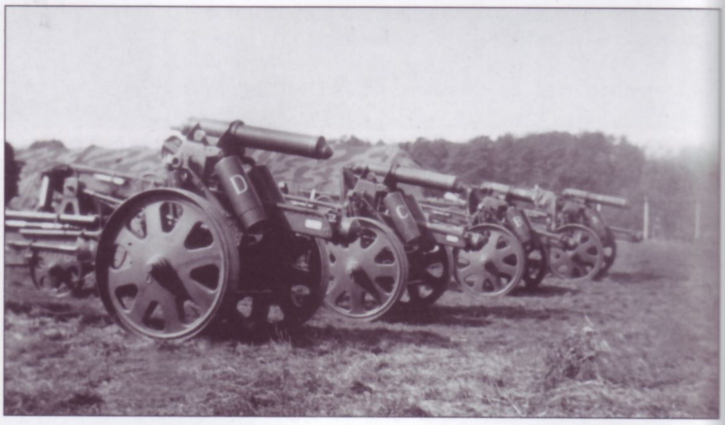
Both the 10cm K18 and its cousin, the 15cm s.FH18, were mounted on the same carriage. The complete piece was too heavy for hauling by the horse-drawn artillery units in the Infanterie-Divisionen, which necessitated the breaking down of the piece into two loads. Here, the carriage is hauled by a team of six-horses and a limber; the gun tube would also be hauled in a like manner, on a special-purpose limber. Note the all-steel wheel type as normally seen on horse-drawn artillery.



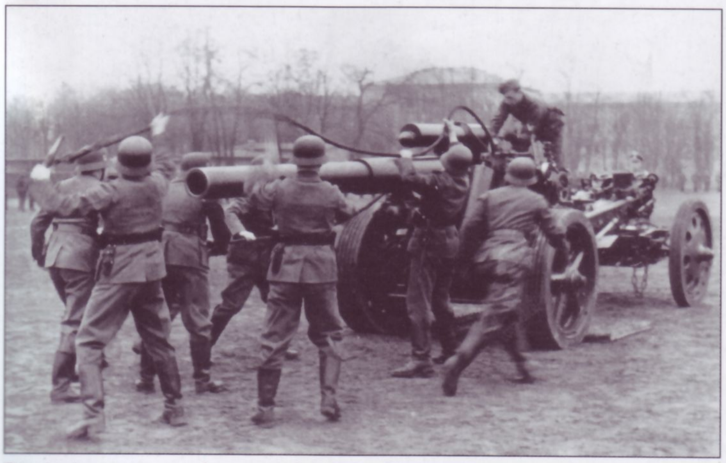
Here, a 10cm K18 is receiving a gun tube. Note that the piece is configured for motorized hauling as can be seen by the rubber rims on its wheels. Other items of interest are the "U"-channel-shaped rails on the partially-spread trail legs, which were used to place the gun tube onto the carriage, and the earth spades laying at right in the photo.



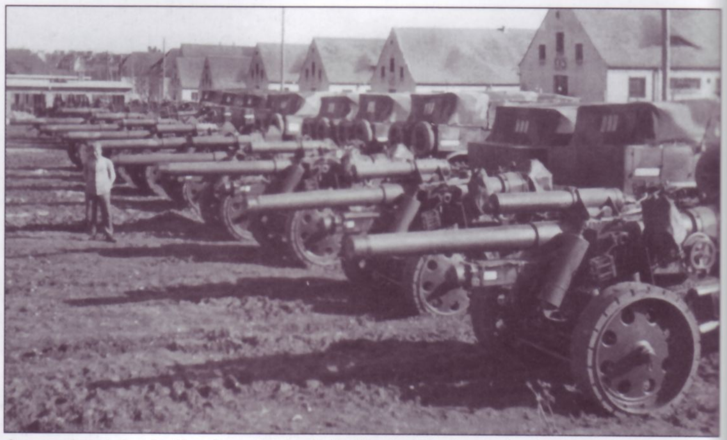
Strangely, this 10cm K18 has been left standing on an engineer bridge, while its tractor is almost across. It may be that the combination was too heavy for the bridge, and that the tractor will use its winch to haul the gun across, once it is on the opposite bank. The piece has its gun-in-battery letter, "B", painted on the equilibrator tubes on either side of the recoil slide.



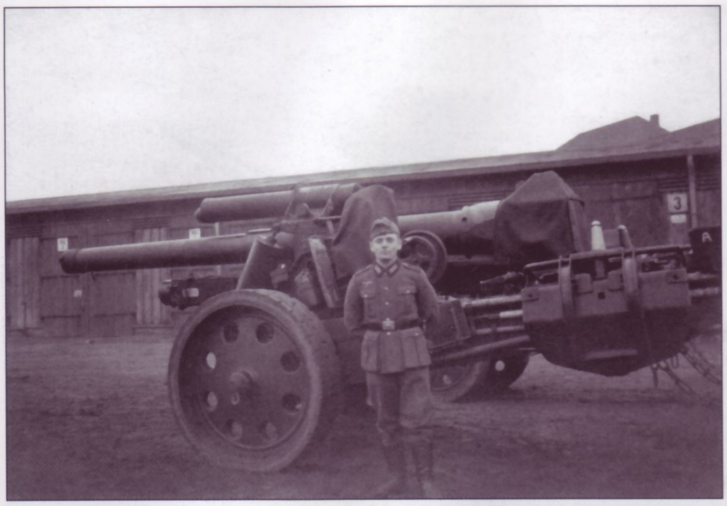
An entire four-piece battery from an Infanterie-Division is on display for the camera. Note that each carriage has a gun-in-battery letter on the equilibrator tubes (A, B, C and D), and that there are data plates visible on the recoil slides of the two nearest the camera. Each also has a travel locking device at the rear of the recoil slides. In the background are several large field tents, all finished in the pre-war "feuersicherem Buntfarbenanstrich" three-tone camouflage color system.



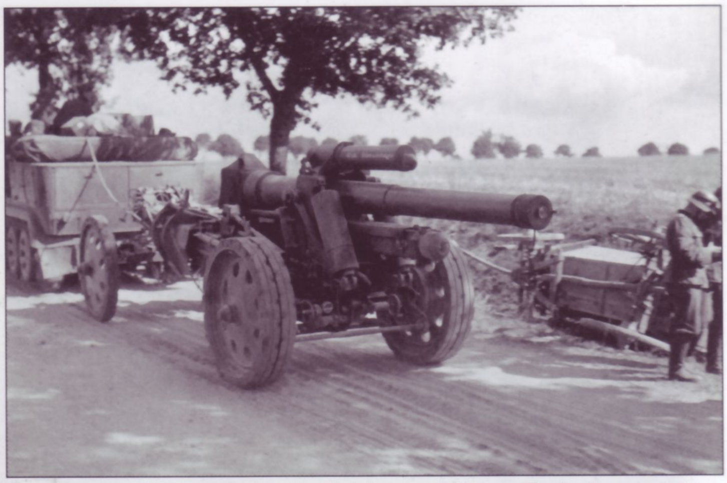
Displaying a sense of urgency for their officer and other observers, the crew of this 15cm s.FH18 appears to be placing a tow cable around their piece. Note that this howitzer has the less common style of cast wheel with rubber rim on the carriage, and the more common style of wheel with perforated hub on the limber. There are also wicker mats just behind the carriage's wheels; these were often placed under the wheels to spread the weight of the piece on soft ground, or to provide a working platform for the crew.



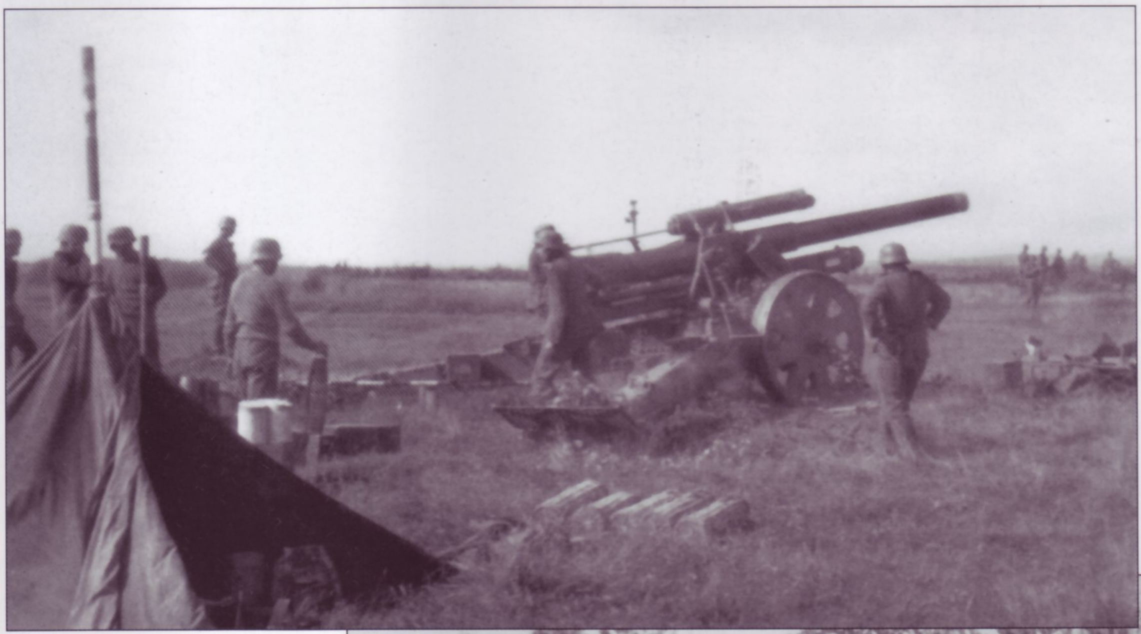
Approximately half of a typical Artillerie-Regiment's heavy ordnance is displayed before the camera; in this case the pieces in question are all 15cm s.FH18s. They are all hitched to their tractors, which are mittlerer Zugkraftwagen 8-ton Sd.Kfz.7 half-tracks. Note that some of them have spare wheels on the rear of their bodywork, indicating that they are KMm9 or KMm10 types. Those without the spare wheels are the later KMm11 types. The tractors (and most likely the howitzers as well) are finished in the pre-war "feuersicherem Buntfarbenanstrich" three-tone camouflage color system, including their canvas foul weather covers.



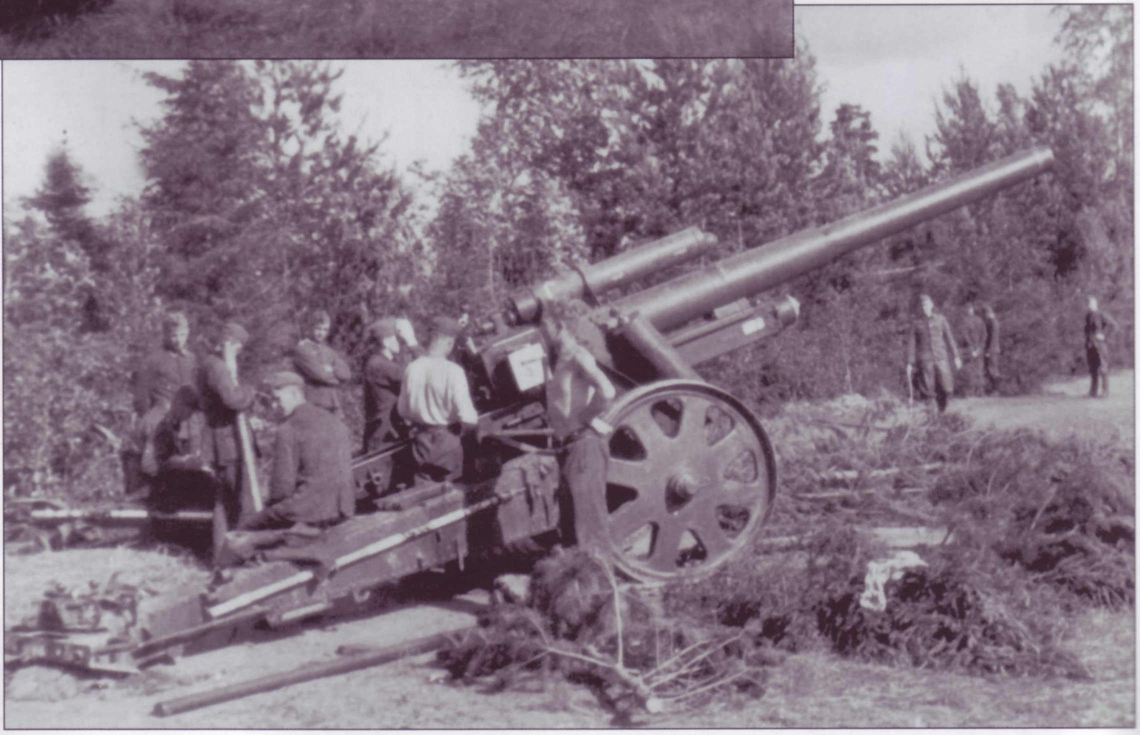
A lone Heer (Army) artilleryman proudly stands before his 15cm s.FH18. A number of interesting features are depicted including the covers over the muzzle, breech and sights; earth spades stored on the trail legs (note the small gun-in-battery letter "A" on the item behind the near spade), and the small data plate on the recoil slide. Compare the perforated wheel style on the carriage to the star-shaped type seen in a previous photograph.



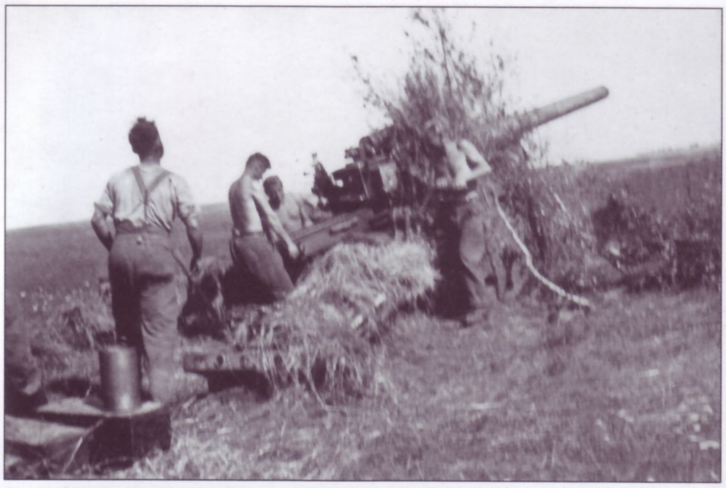
This 15cm s.FH18 is being hauled by its mittlerer Zugkraftwagen 8-ton Sd.Kfz.7 on a country road. Typical for a howitzer in travel mode, the gun tube has been run back on the recoil slide to shorten the overall length of the entire combination. Canvas dust covers are also to be seen at the muzzle and breech ends of the gun tube. The strap running from the rear of the tractor's body to the piece was used to activate an emergency brake; this item is usually seen in use on horse-drawn ordnance.



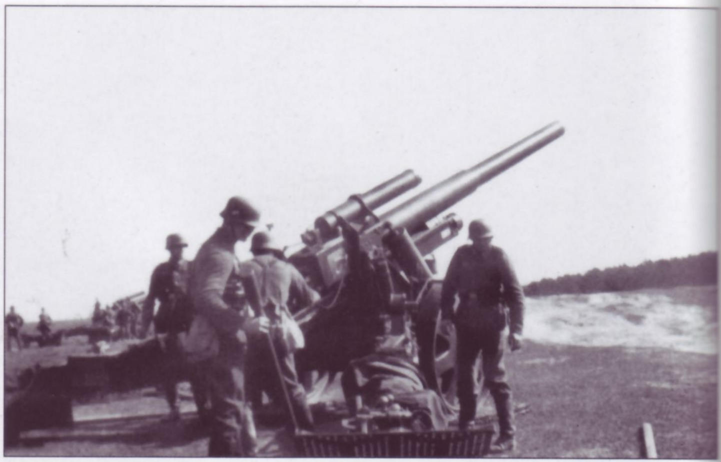
This 15cm s.FH18 has been caught at the moment of firing by the photographer, and is in full recoil. Note the wheel style associated with a horse-drawn piece and the auxiliary elevation hand-crank on the near trail leg. At left and in the foreground are various parts of the piece's ammunition and storage containers.



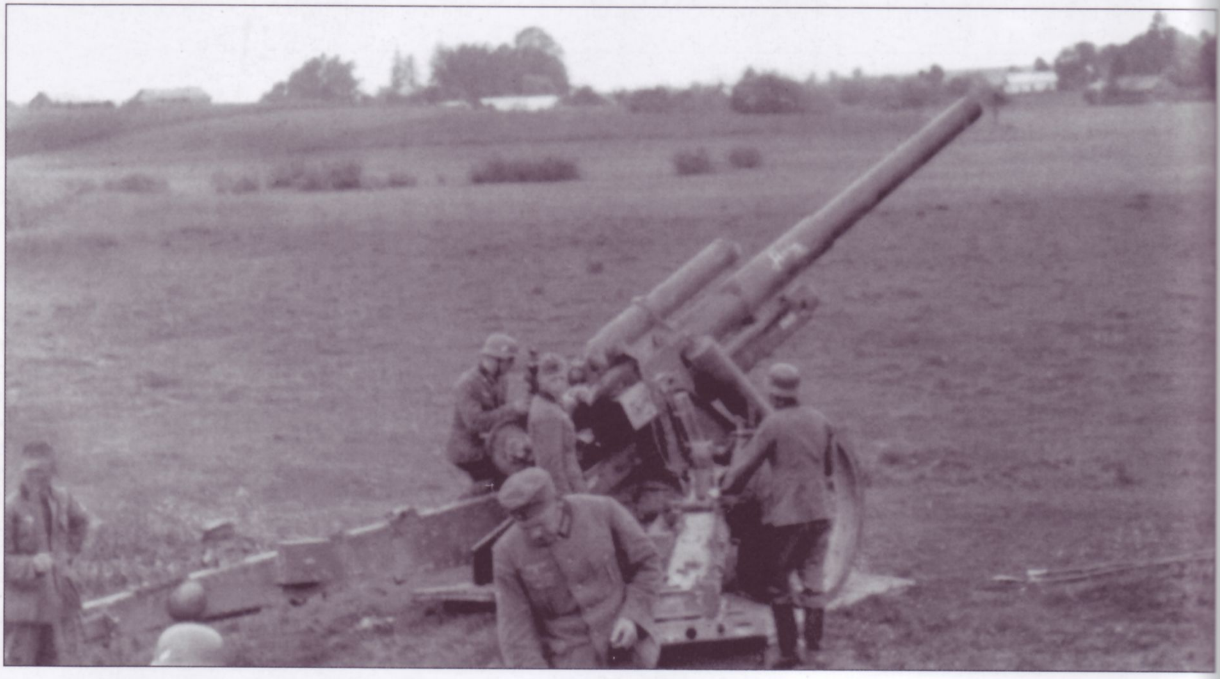
The crew of this 15cm s.FH18 improves their position by cutting branches from nearby trees to help conceal their piece from prying enemy eyes. The howitzer has wheels associated with a horse-drawn piece. The piece's earth spades have been fitted to the ends of the trail legs and dug in, to stabilize the weapon during firing.



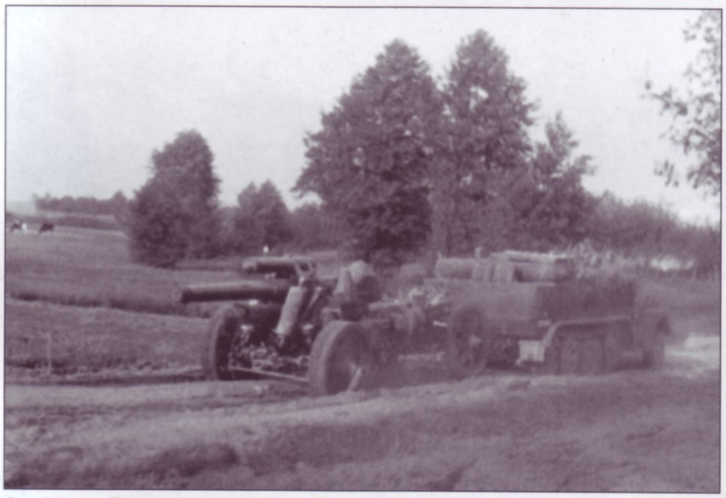
A similar photo of this 15cm s.FH18 appeared in volume one of this series; note how one man is operating the trail leg-mounted auxiliary hand-crank for the elevation gear (at right) and the case for the powder charge laying at far left.



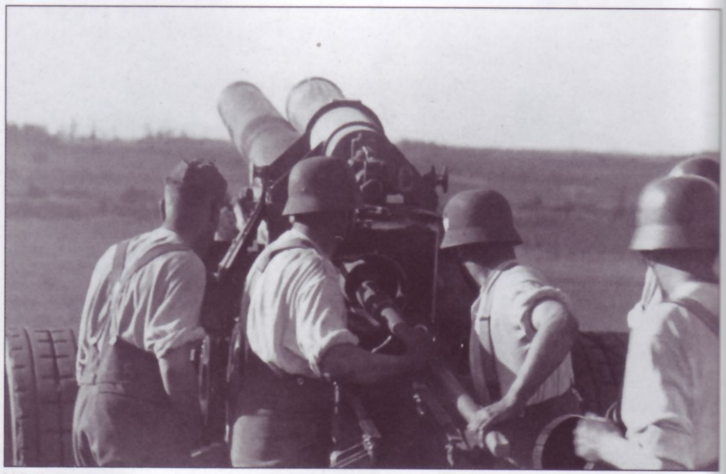
While the gunner prepares to yank the firing lanyard, one of the ammunition handlers stands by with his ramming staff to help feed another round into this 15cm s.FH18. Note that this howitzer, like many others seen in this book, has a data plate on the recoil slide housing and that it also has been fitted with the wheel type associated with a horse-drawn piece.



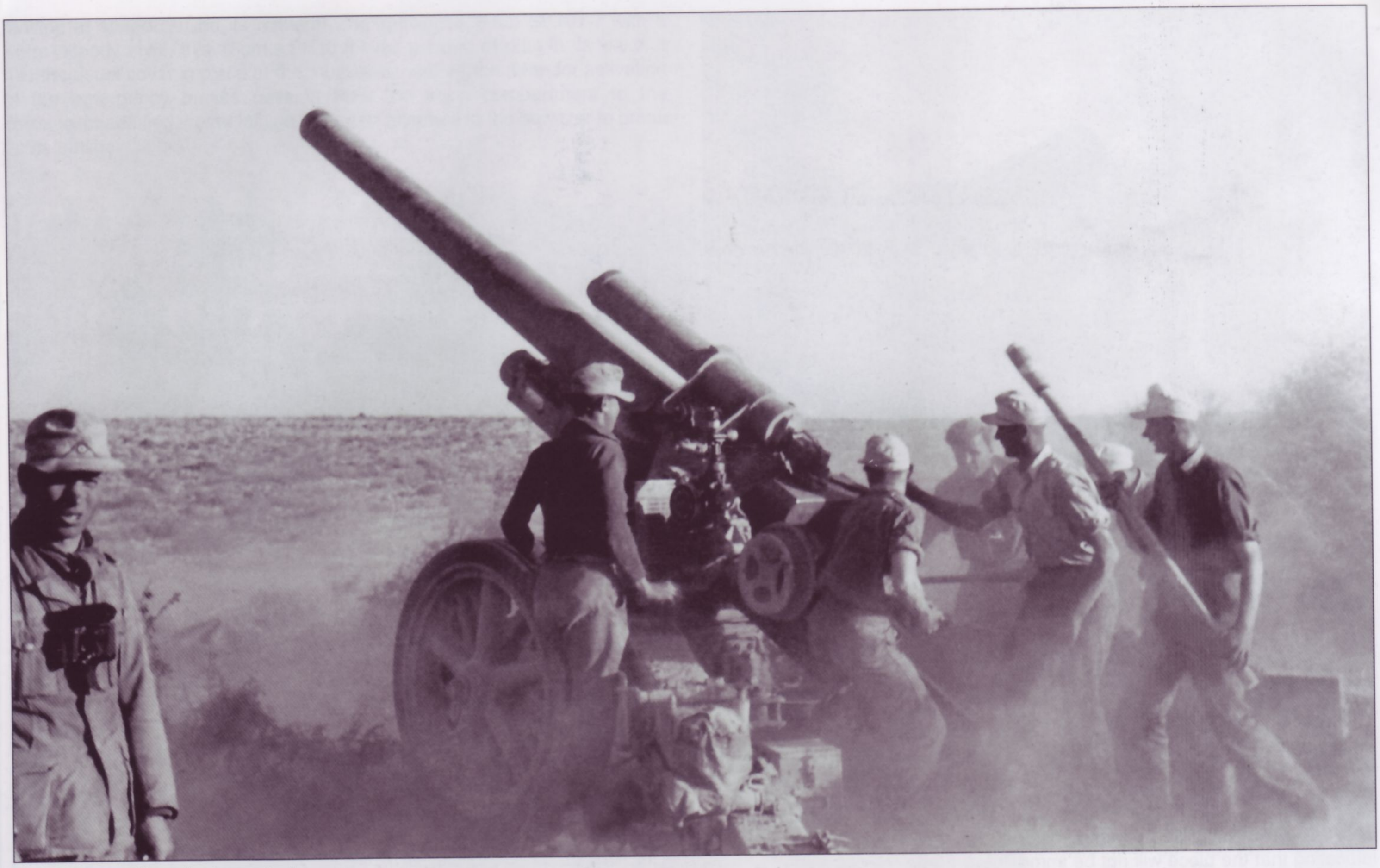
The crew of this 15cm s.FH18 finalizes preparations for a training shoot. Note how a wicker mat has been placed under the carriage's wheels to help prevent them from sinking into the earth, and that the auxiliary hand-crank for the elevation gear has been attached to the trail leg at right.



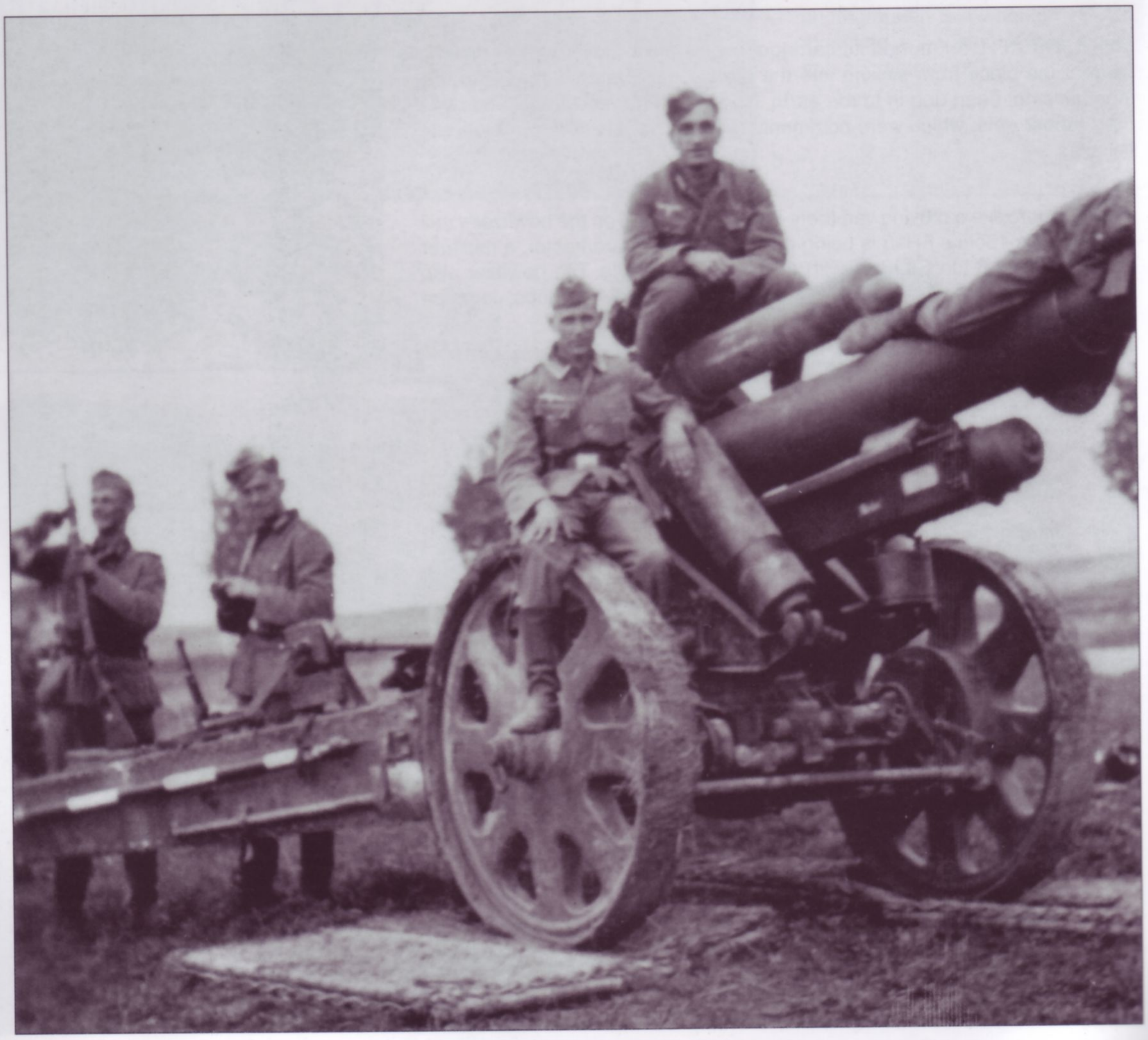
A mittlerer Zugkraftwagen 8-ton Sd.Kfz.7 with a KMm10 body style hauls a 15cm s.FH18 towards its next firing position. The shorter track run, front fender style and lack of spare wheel stowage on the rear of the body identifies the tractor type. The howitzer has had its gun tube run back in the recoil slide to shorten the combination, and the usual dust covers have been installed to protect the breech, muzzle and sights.



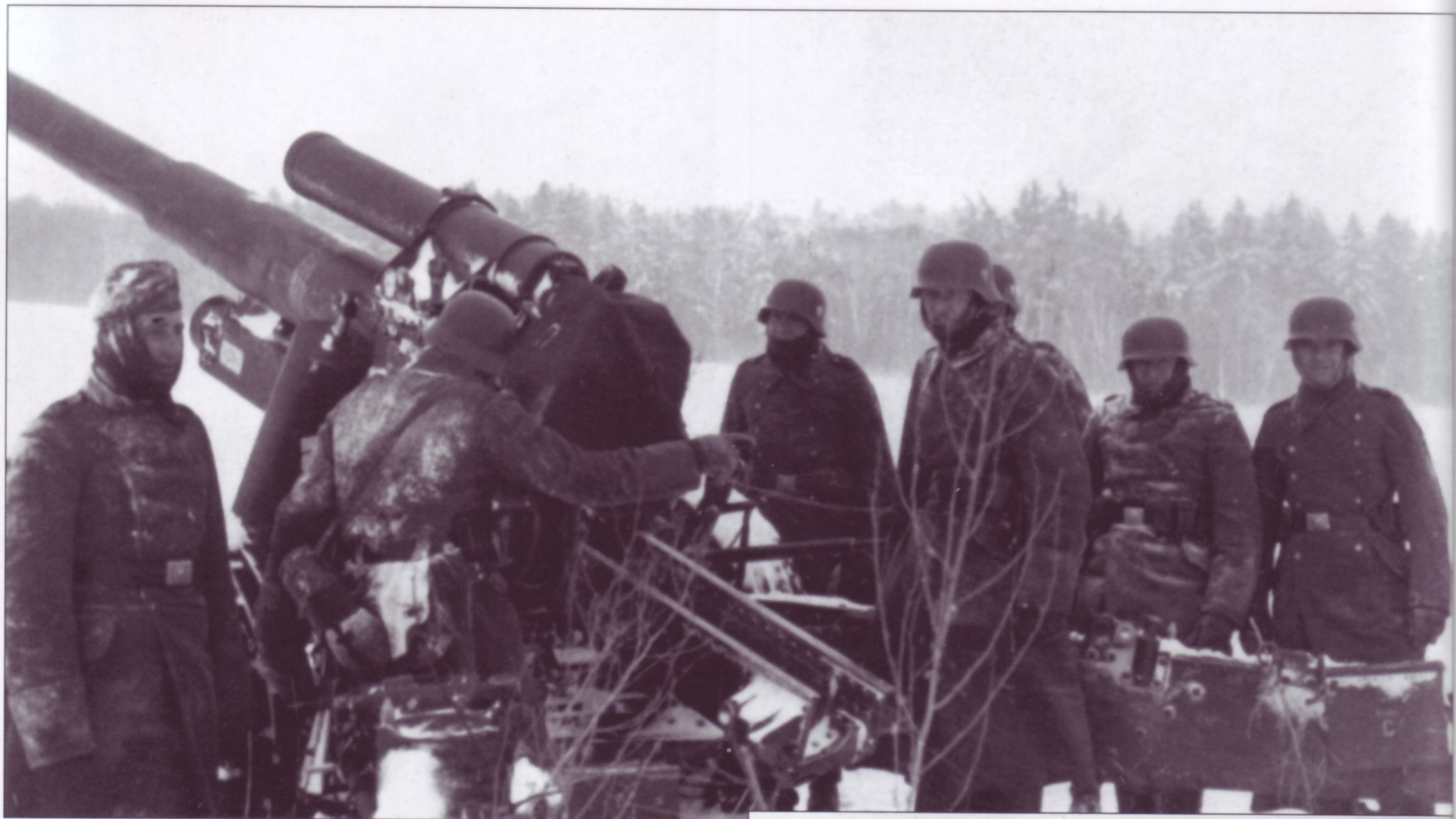
While two men ram the powder charge into the breech of this 15cm s.FH18, another holds the cartridge case for the separate-loading ammunition. With a sliding wedge-type breech block, a case was needed to completely seal that end of the gun tube to prevent the escape of gasses created during firing. A screw-type breech, such as that used on the contemporary US 155mm Howitzer M1, operated in the way its name implied; this provided proper sealing without the need of a cartridge case.



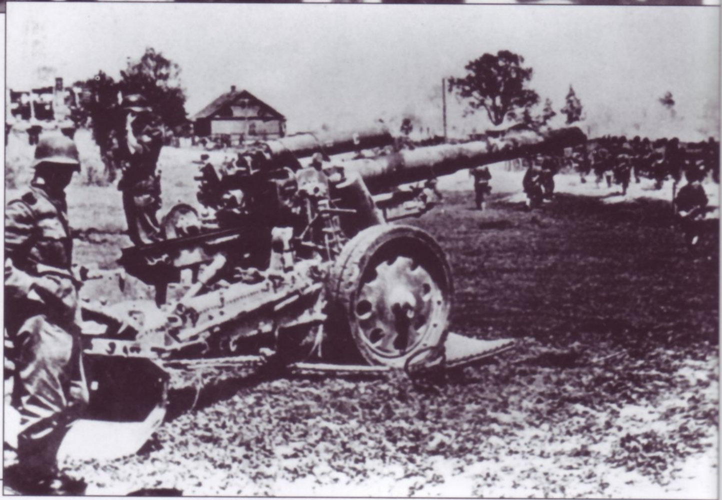
Amid the settling dust created by the firing of the previous round, the crew of this DAK (Deutsches Afrika Korps, German Africa Corps) 15cm s.FH18 prepares to send another shell downrange. Note that this howitzer also has the star-pattern cast wheels with rubber rims, suitable for motorized towing; no horse-drawn pieces served with Rommel's famed desert army.



The Heer (Army) crewmen of this 15cm s.FH18 pose somewhat playfully for the photographer. Note the wicker mats placed under the wheels for better flotation on soft ground as well as the shovel and aiming stake stowed on the trail leg; the auxiliary hand-crank for the elevation gear has been mounted above them.

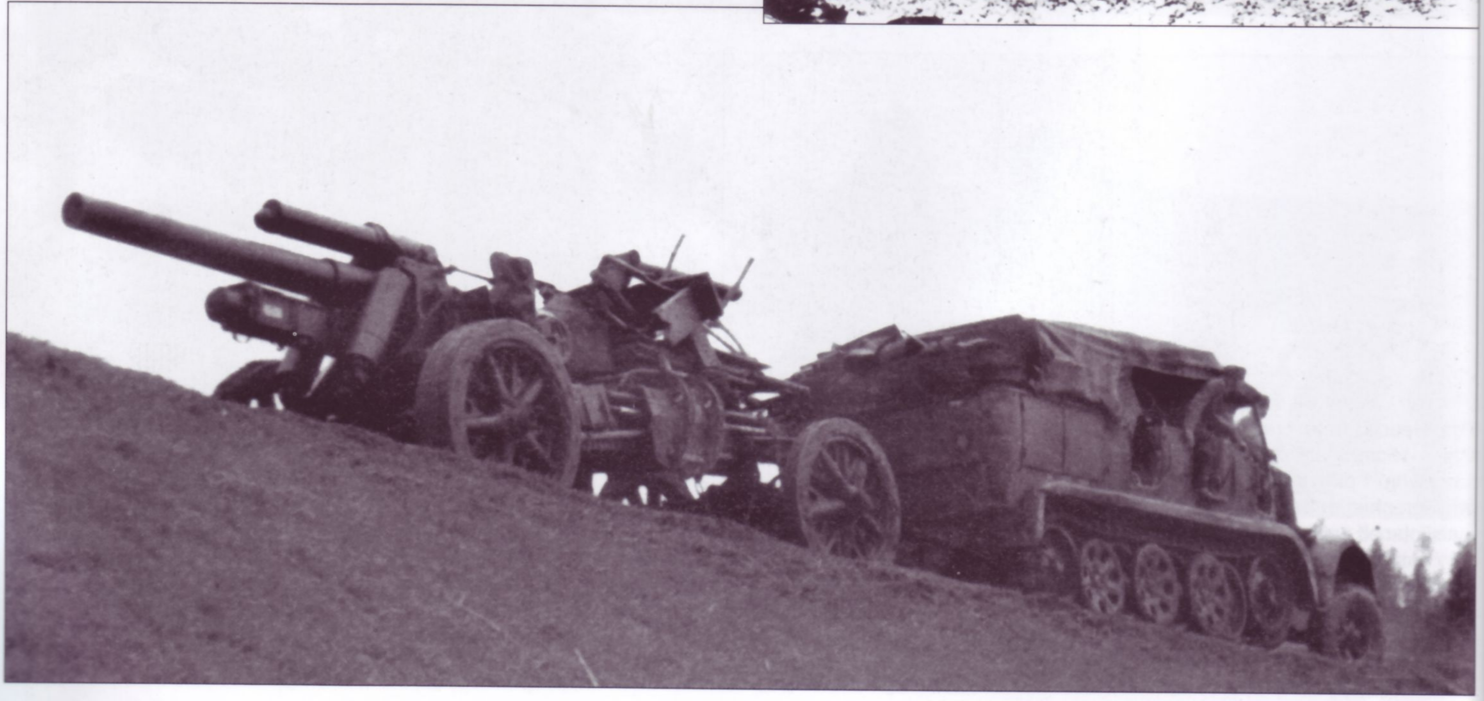


Under blizzard-like conditions, most of the crew of this 15cm s.FH18 stands idly by as the gun-layer adjusts his sights. Note that the cover for the breech is still in place and that no ammunition or ramming staff is in evidence, indicating that the piece will not be immediately fired.

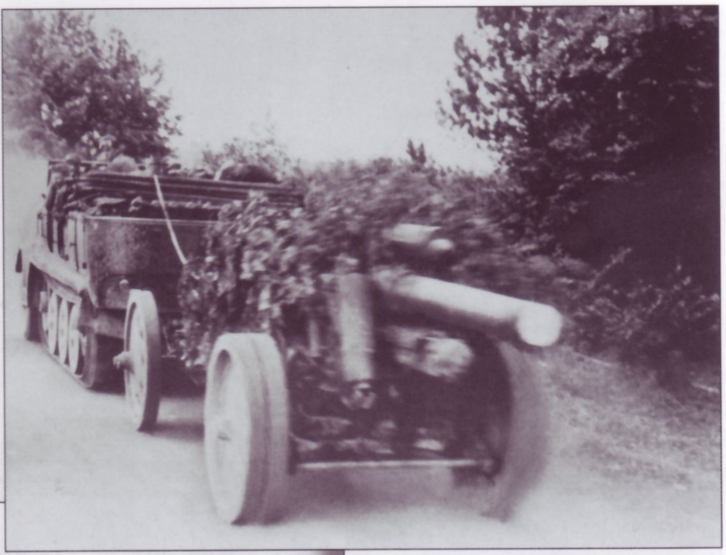


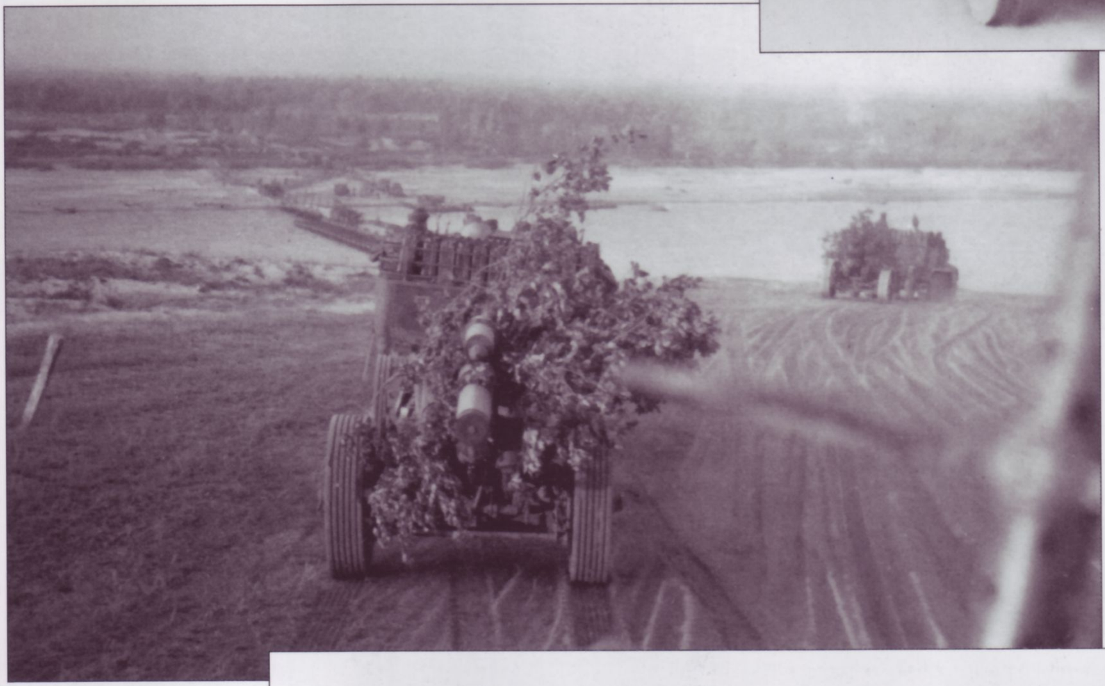
This 15cm s.FH18 has had its carriage wheels placed over wicker mats to prevent the piece from sinking into the ground, but the spades on the trail legs have not been dug in to the earth. Note the perforated wheel hubs and their rubber rims, which were commonly seen on howitzers drawn by motor vehicles.

Looking more like a moving van (note the furniture piled on the howitzer's trail section), this 15cm s.FH18 is being pulled by its standard tractor, a mittlerer Zugkraftwagen 8-ton Sd.Kfz.7 with a KMm11 body style. The howitzer also has been fitted with the less-common star-shaped cast wheel hubs; compare them to the previous photograph.

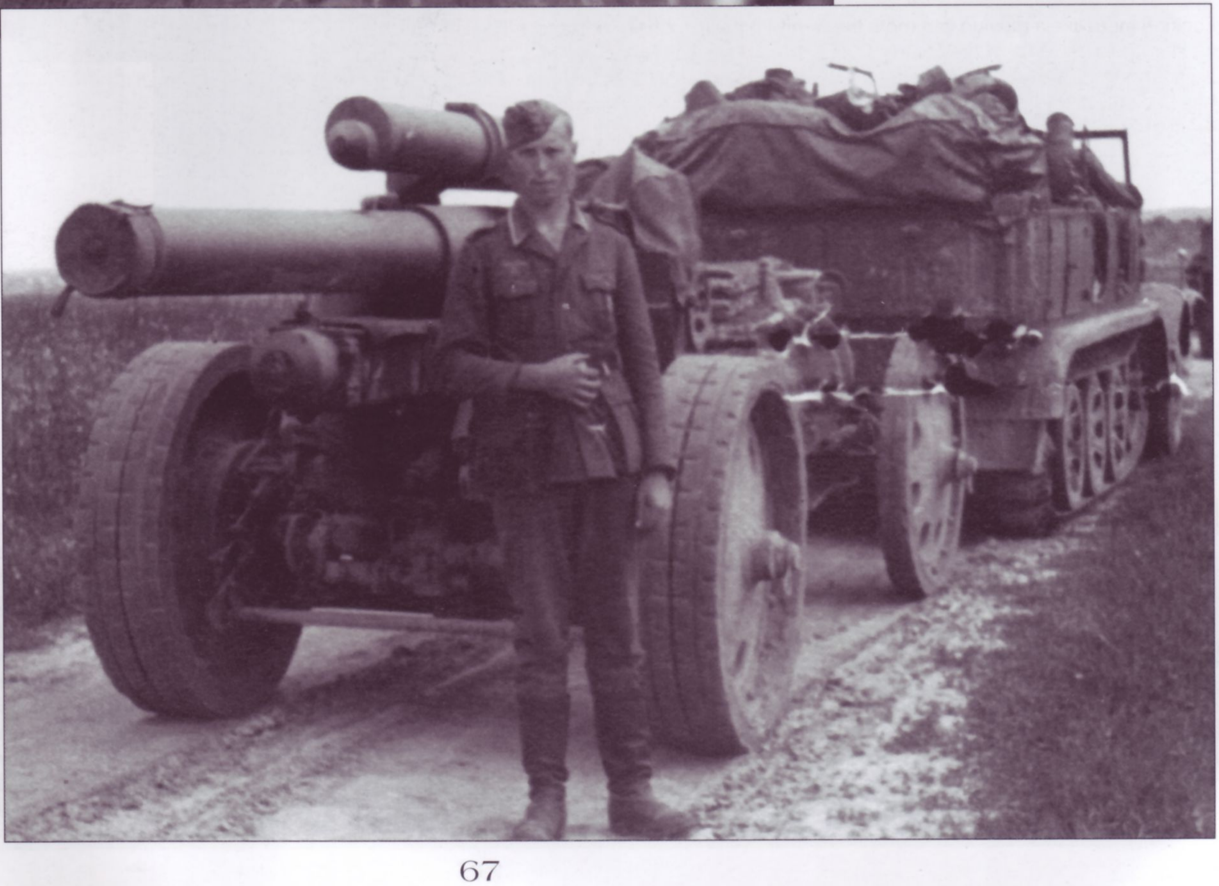


Moving at speed behind its mittlerer Zugkraftwagen 8-ton Sd.Kfz.7 with a KMm11 body style, this 15cm s.FH18 leaves a cloud of dust in its wake. It has the usual cover in place at the muzzle, as well as the strap for activation of the emergency brakes passing from the troop compartment to the carriage. In addition, some foliage has been attached to the howitzer to break up its outline.

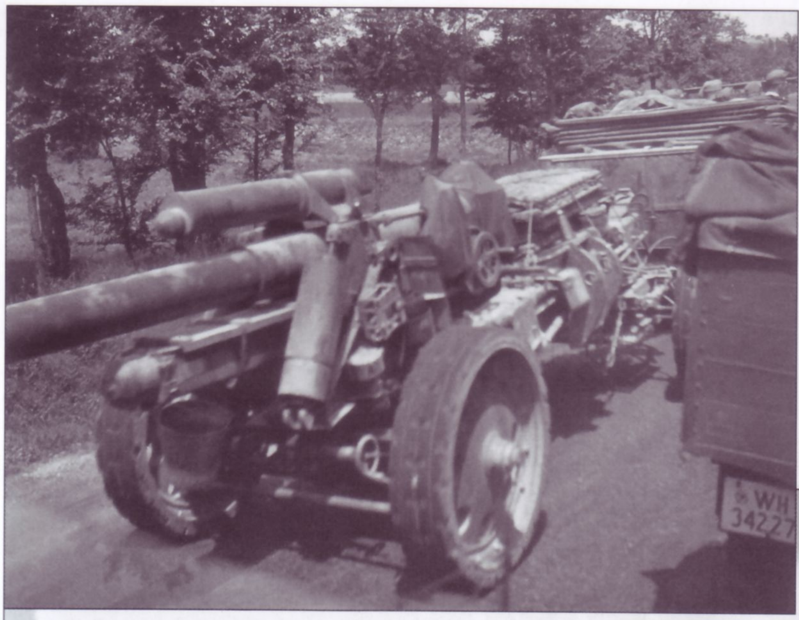




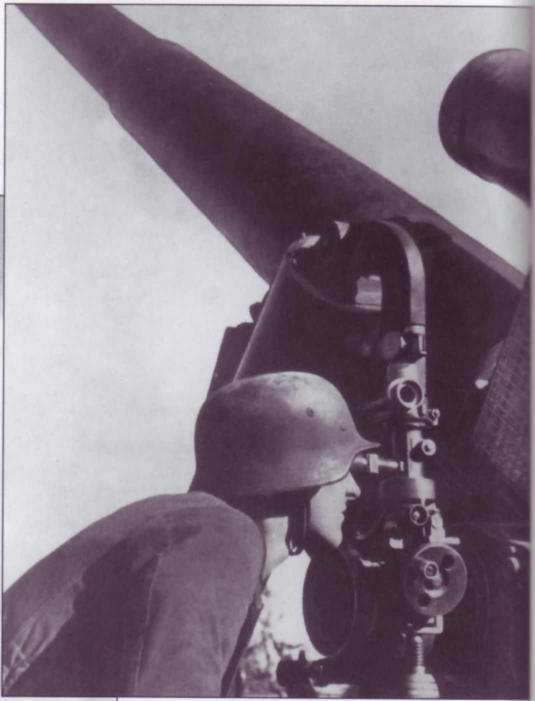
Parts of a 15cm s.FH18 howitzer battery make their way along the dusty approach to a river crossing, probably on the Ostfront. They are hauled by the usual mittlerer Zugkraftwagen 8-ton Sd.Kfz.7 with a KMm11 body style, and exhibit common features such as a muzzle cover and foliage on the howitzer. Bringing up the rear, and also serving as the perch for the photographer, is a wheeled vehicle mounting a 7.92mm MG34 on an anti-aircraft mount.



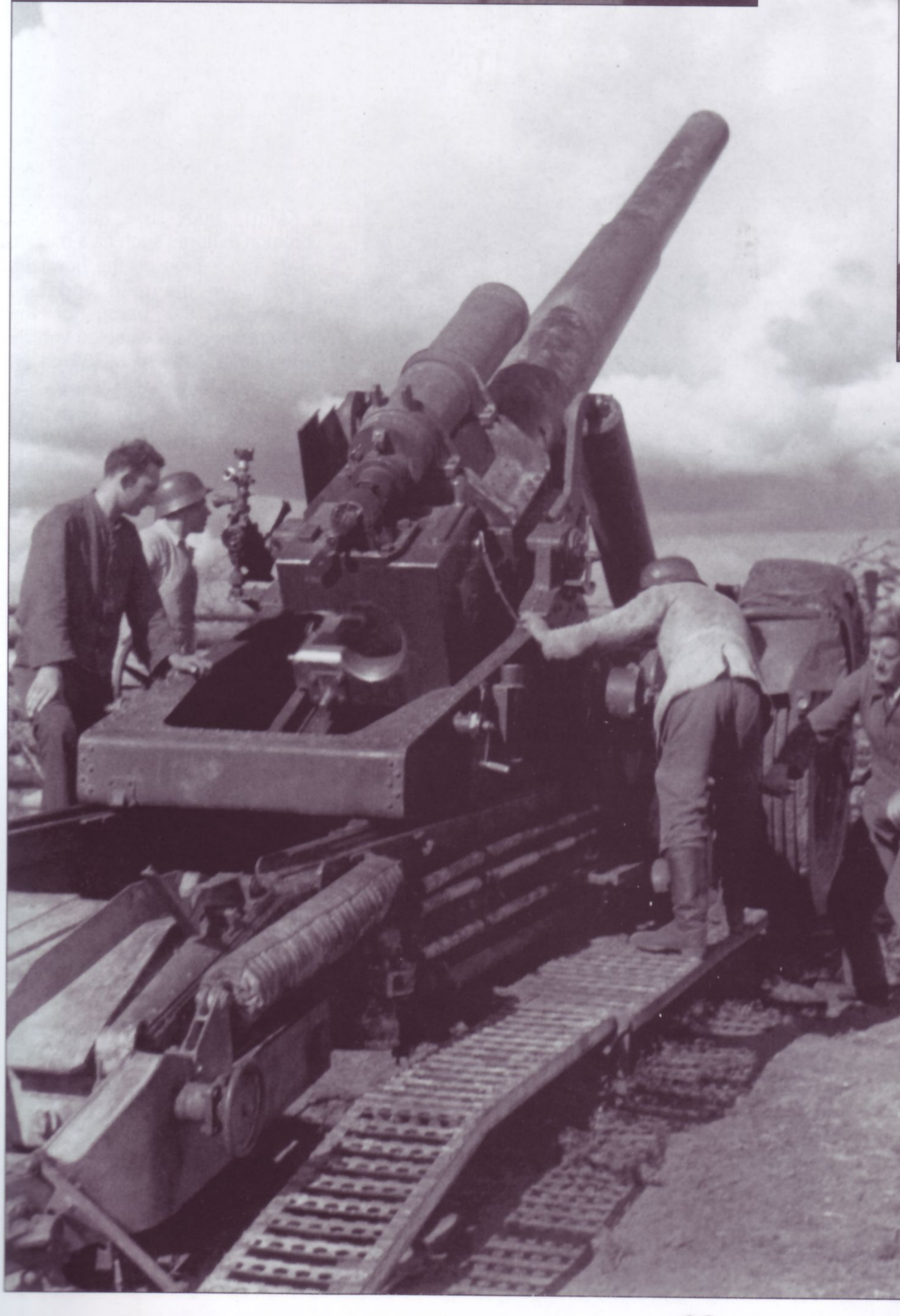
This Heer (Army) soldier poses next to his gun and tractor, a 15cm s.FH18 hauled by a mittlerer Zugkraftwagen 8-ton Sd.Kfz.7 with a KMm11 body style. The gun is in travel order with the tube run back on the recoil slide and a cover on the muzzle. The rear of the tractor's body-work was used to stow all kinds of gear, which in this case includes a motorcycle.



This 15cm s.FH18 is seen being hauled behind a mittlerer Zugkraftwagen 8-ton Sd.Kfz.7 with a KMm11 body style. Typically covers are in place over the muzzle, breech and sight, which considering the very dusty appearance of the howitzer, is a prudent measure. Units often used the platform created by the closed trail legs to stow extra gear, as seen here.

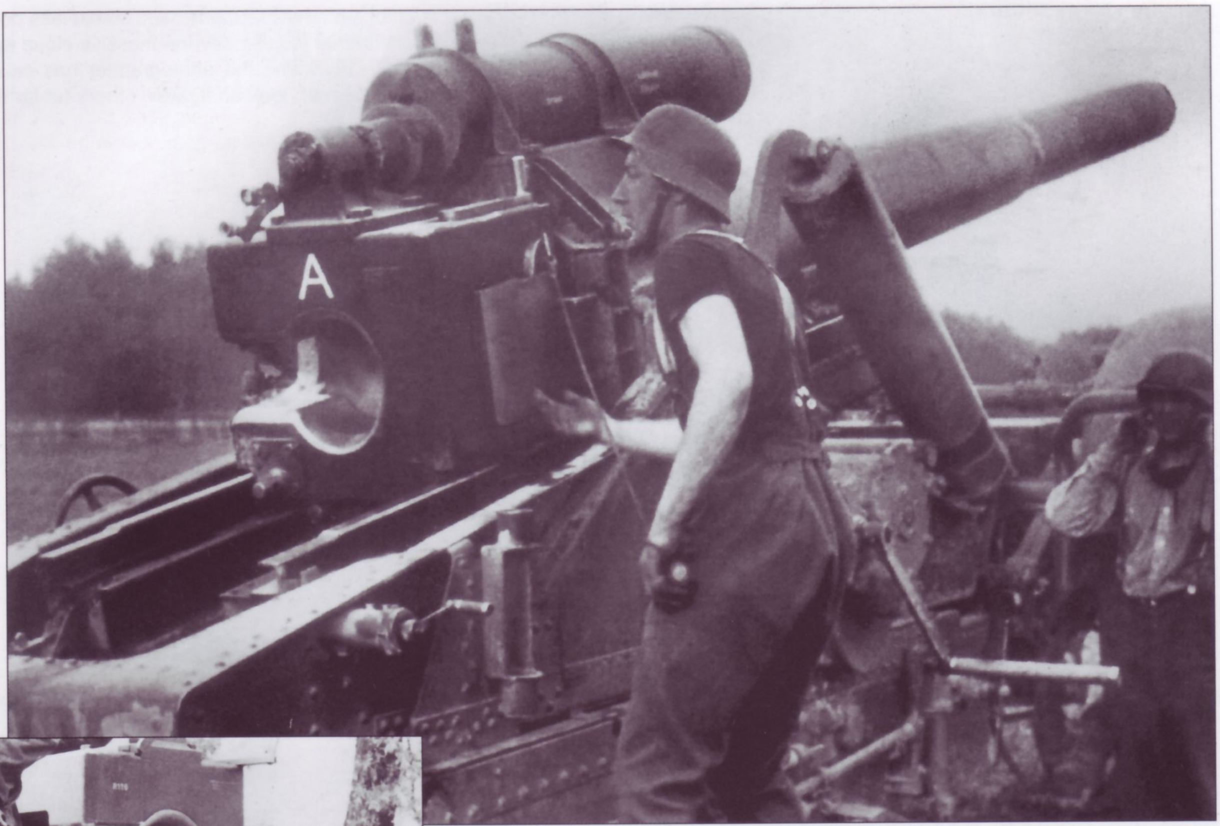


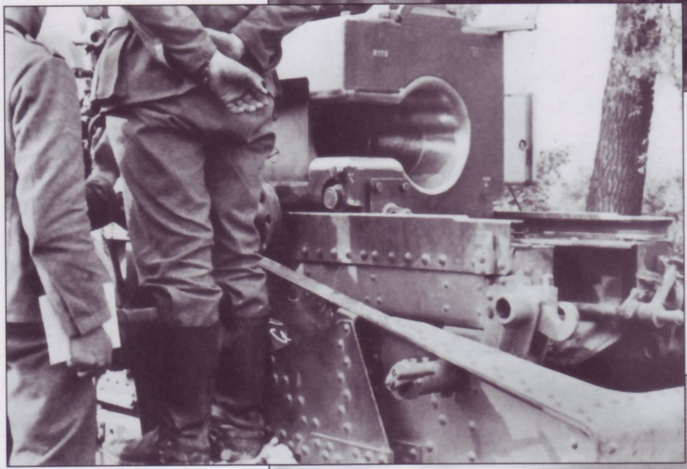
A helmeted gun-layer peers through the sight of his 21cm Mrs18. This close-up provides some details of the various parts of the sight, as well as showing the range-data table at right.



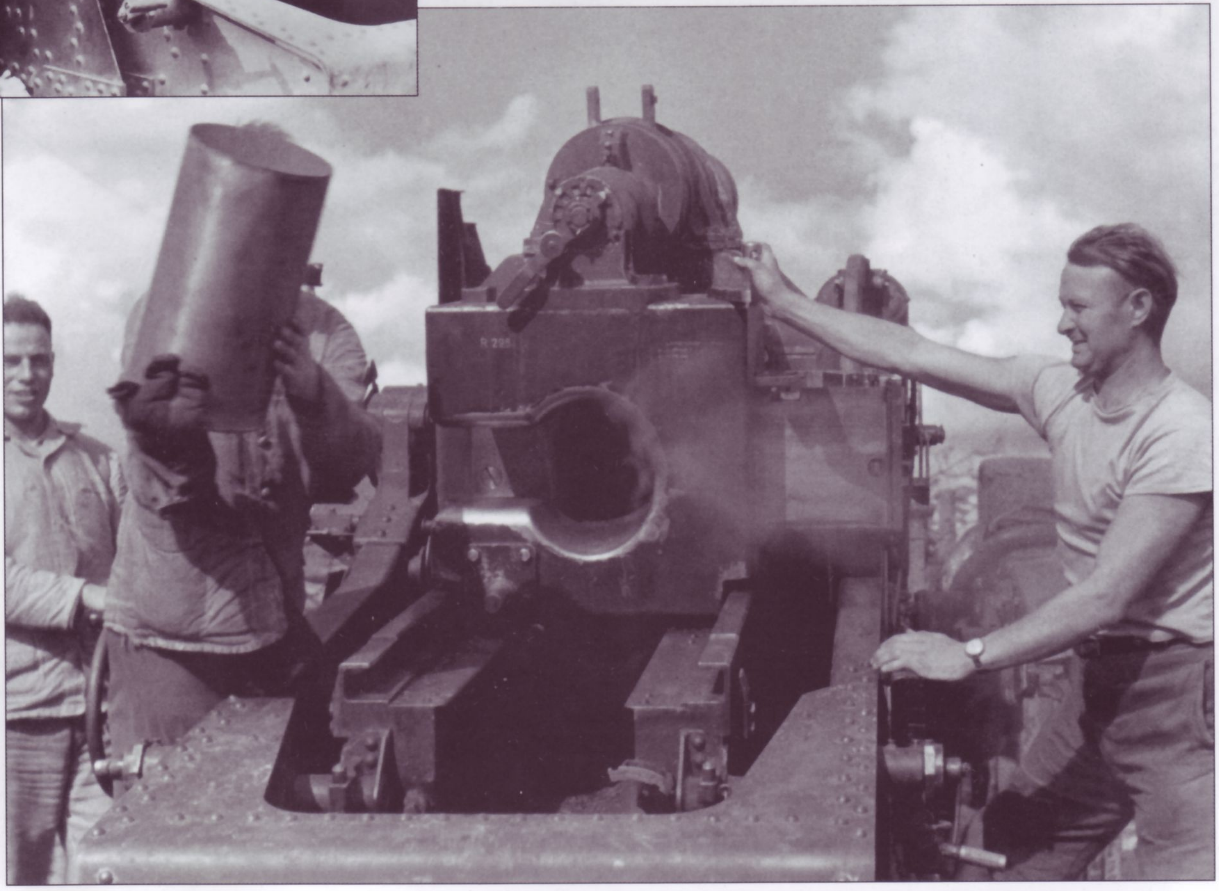
While one crewman peers through the sight, others check various areas of their 21cm Mrs18 as they prepare their piece for the day's work. Note the working platform along the side of the box trails and the raised configuration of the carriage's wheels. This photograph also affords a fine view of the upper carriage, which recoiled along the trails when the piece was fired; the gun tube also recoiled within its slide, which was a unique feature of Mörserlafette 18 mount.

While one of his comrades covers his ears, the gunner of this 21cm Mrs18 prepares to pull the firing lanyard. Note the gun-in-battery letter, "A", on the rear face of the massive breech block as well as the position of the gun tube in relation to the upper carriage assembly. The tube recoiled along the slide, while the entire assembly recoiled along the lower carriage segment.

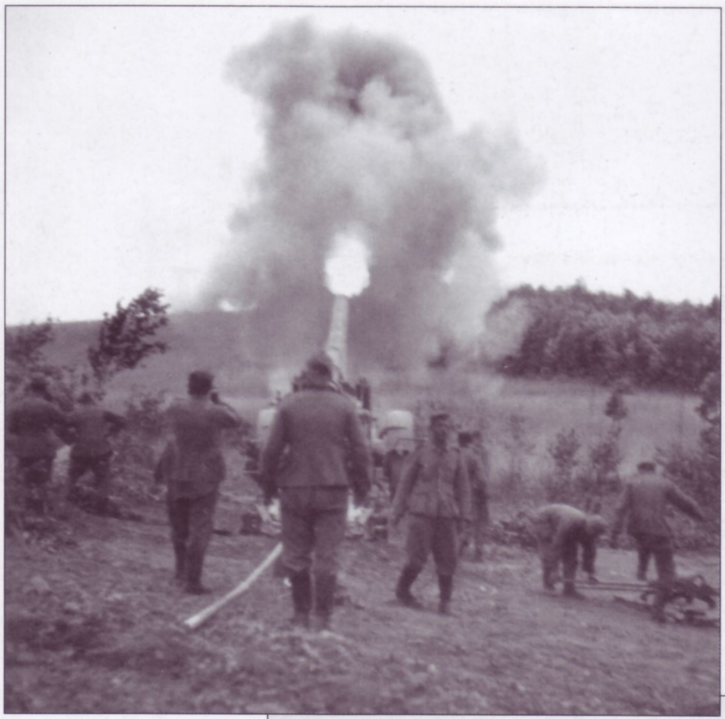




From this and the previous photo, it would seem that those who were able to photograph these large pieces of ordnance were fascinated with the massive breech block. Note the serial number, R114 or R116 on the breech block of this 21cm Mrs18; the "R" stood for "Rohr", which translates to gun tube or gun barrel.

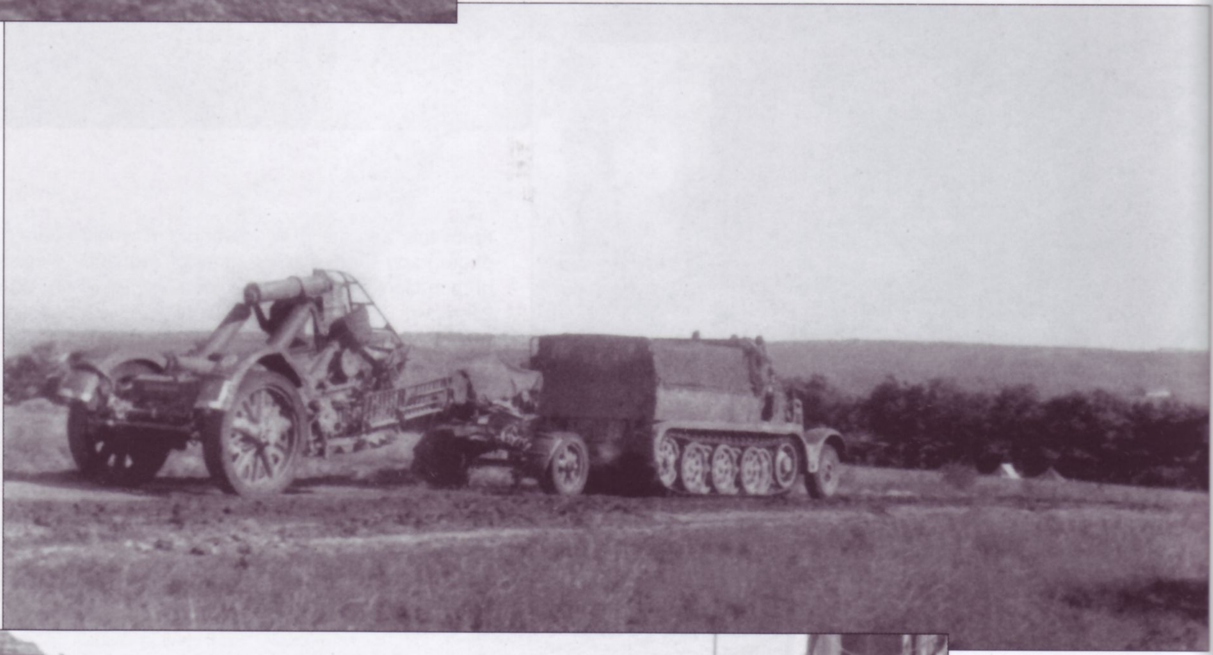


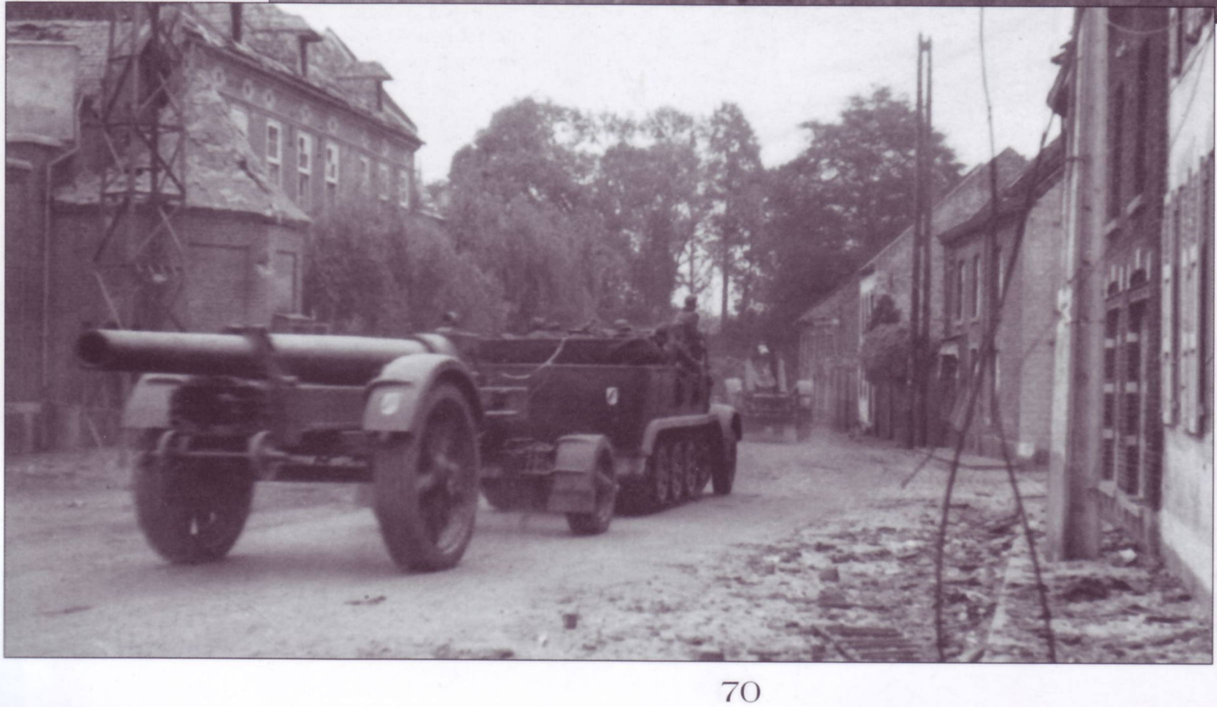
Propellant gasses escape from the opened breech block of this 21cm Mrs18, as one of the ammunition handlers grasps a spent shell case. This piece fired multi-piece separate-loading ammunition that consisted of a projectile, bagged powder charge and a primed shell case; the last item was needed to ensure the proper sealing of the wedge-type breech during firing.



It is often said that Germany used smokeless powder during World War Two, something that is belied by the massive cloud spewing from the bore of this 21cm Mrs18, which the photographer has caught at the moment it fired. While some men look on in awe, others (at far right) prepare another round for the enemy.

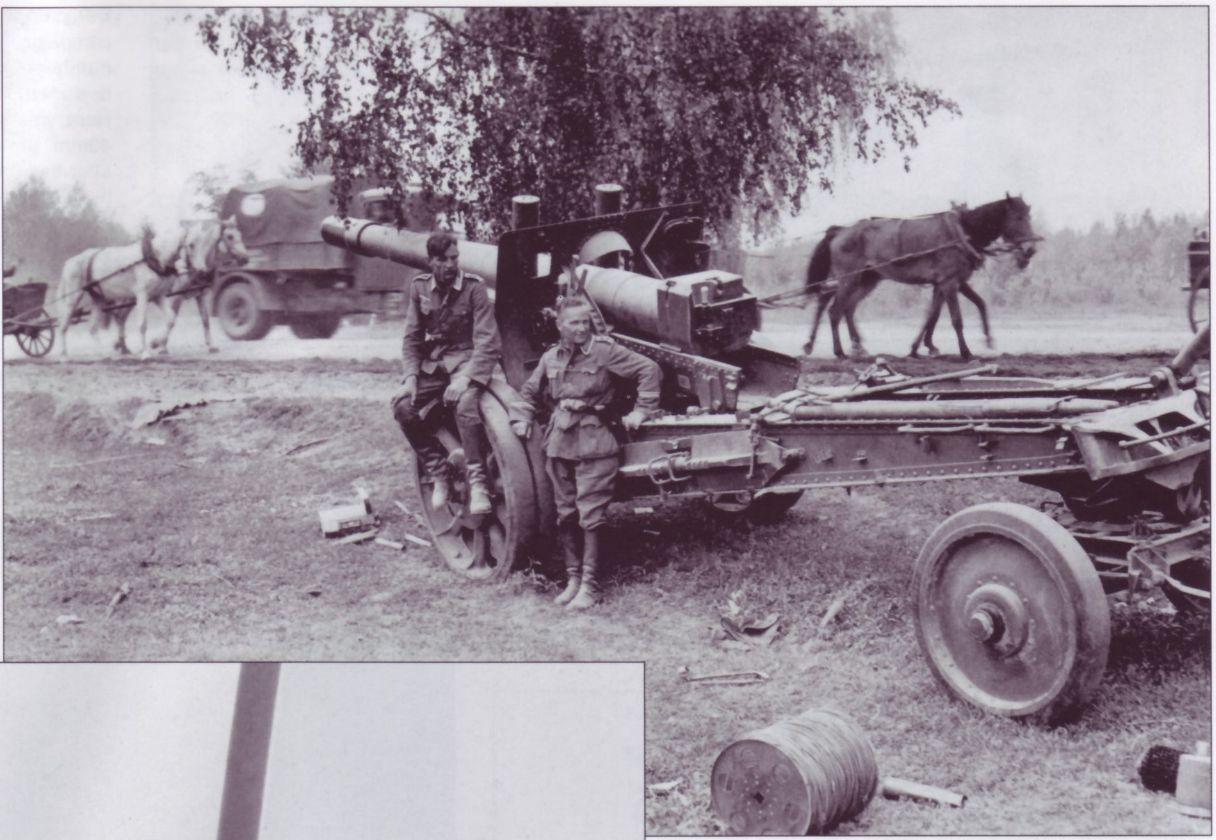
Due to its extreme weight, the Mörserlafette 18 carriage was hauled separately from the gun tube, in this case by a schwerer Zugkraftwagen 18-ton Sd.Kfz.9 tractor. Note the limber that was used to attach the box trails to the tractor, as well as the canvas cover over the tractor's cargo bay. Although a specialized "artillery body" was tested for this tractor, it never went into production, with only a prototype being built.

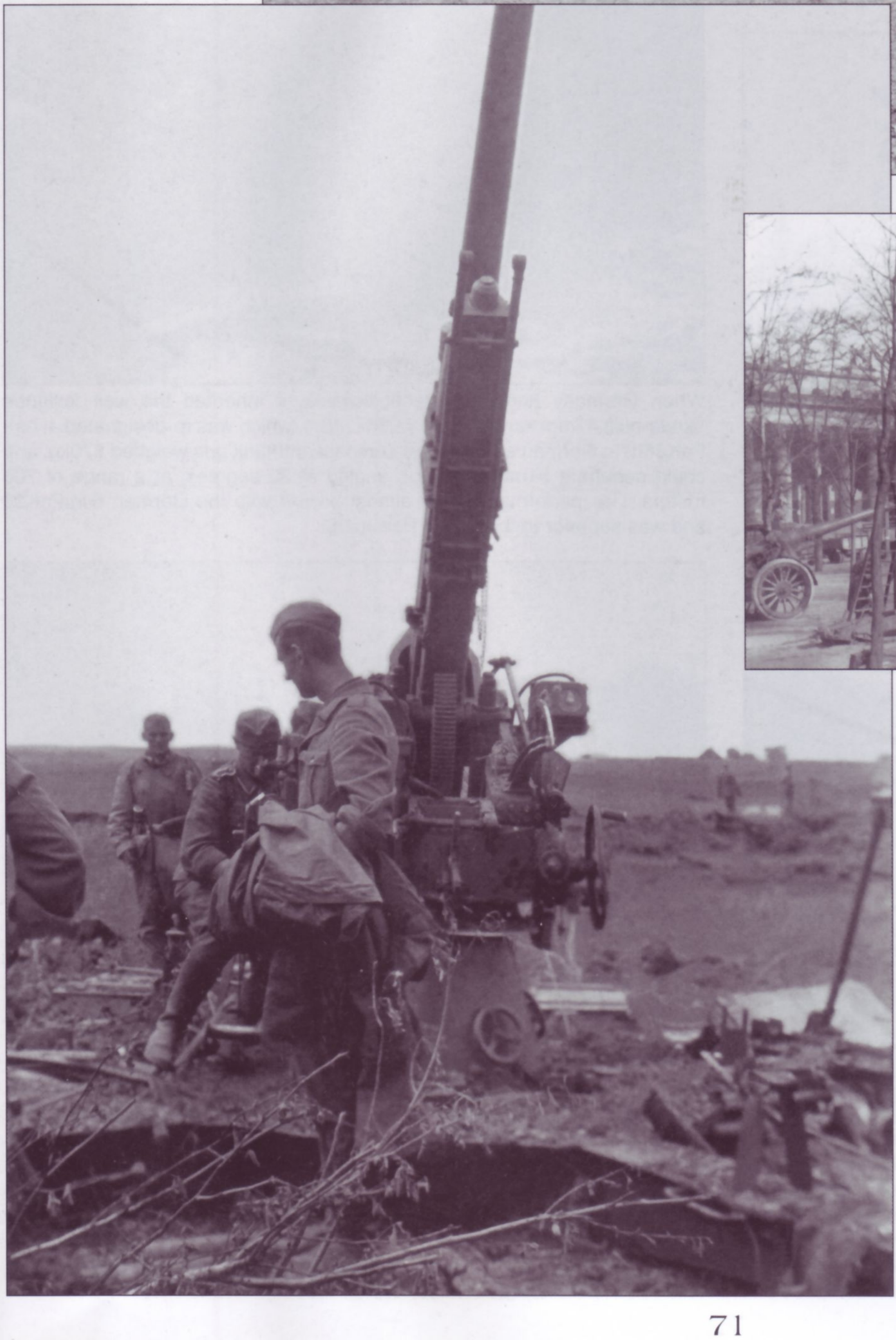


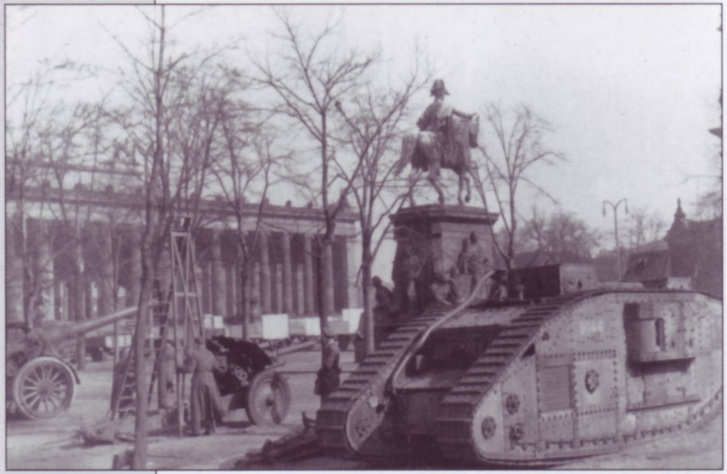


A Zugkraftwagen 8-ton Sd.Kfz.7 hauls the gun tube of a 21cm Mrs18 on its specially-designed carriage. It used many components in common with the Mörserlafette 18 carriage, including the wheels and limber. This combination is preceded by the carriage, seen in the background at right in this photograph.

This abandoned Soviet 152mm Gun-Howitzer Model 1937 (ML-20), serves as a backdrop for a photograph of tired, but optimistic German soldiers as they push forward during the early stages of Operation Barbarossa in 1941. This gun's elevation cylinders leaned rearwards (opposite those on the previous 1910/34r version), and it was given the German designation 15.2cm KH433/1(r). It weighed.7930kg, and could hurl a projectile weighing 43.56kg out to a range of 17,265-meters.

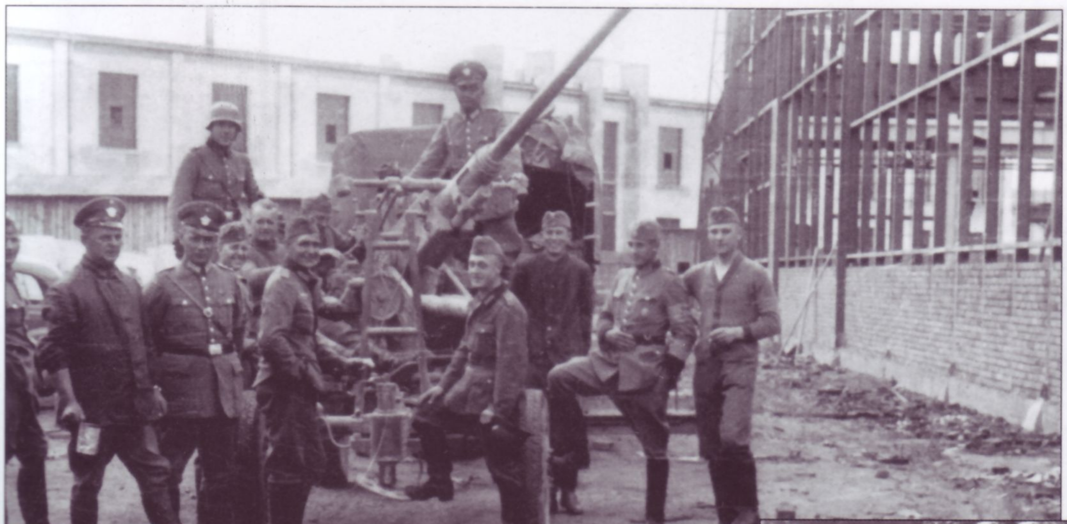




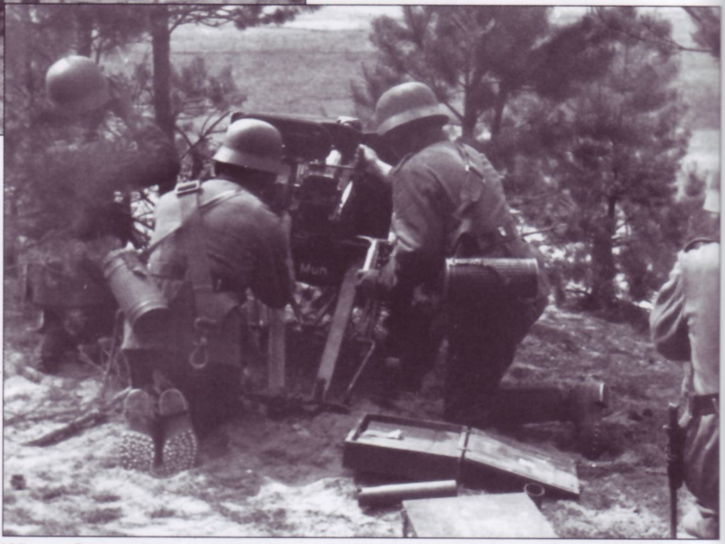


In a conquered Soviet city, German ordnance specialists prepare to work on a Red Army 122mm Field Howitzer Model 1938. When in German service, this piece was designated 12.2cm sFH396(r). Its overall weight was 2,800kg and it could fire a shell weighing 21.76kg out to a range of 11,800-meters. In the foreground sits a World War One-vintage, ex-British, Mk IV heavy tank.

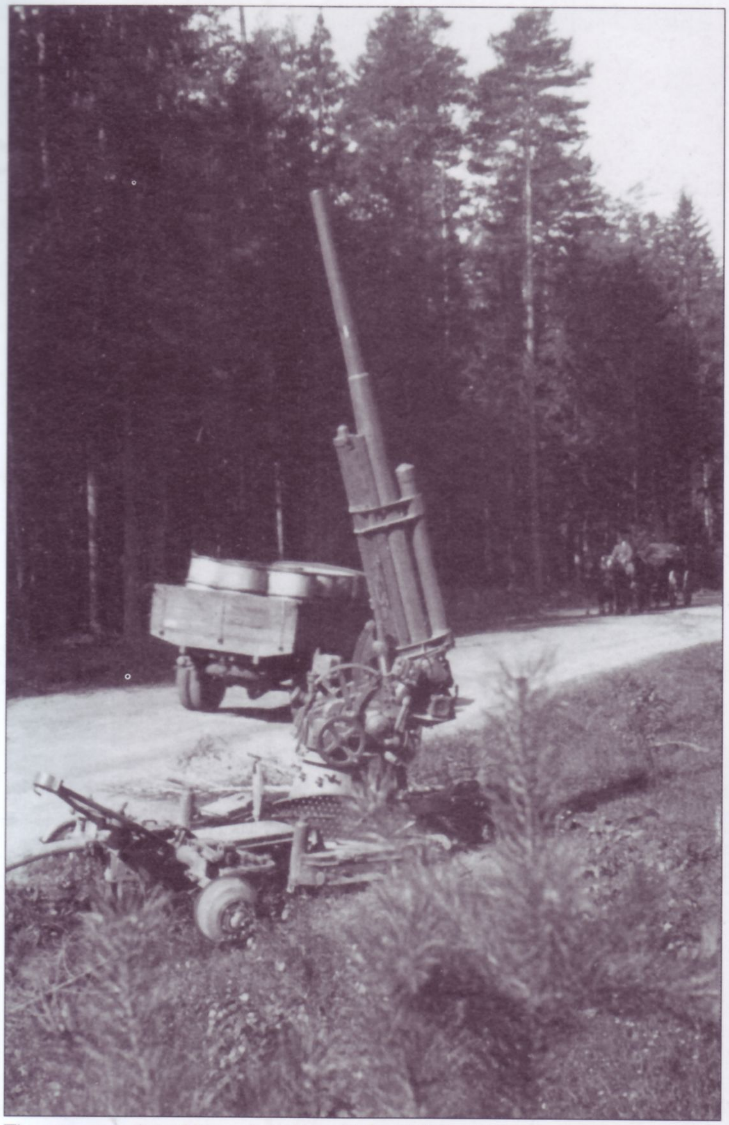
German soldiers man an ex-Soviet 76.2mm Anti-Aircraft Gun Model 1931, somewhere on the Ostfront. This obsolescent piece weighed 4,820kg in travel order, and fired a shell weighing 6.61kg up to a ceiling of 9,300-meters. The German designation for this piece was 7.62cm FlaK M.31(r).



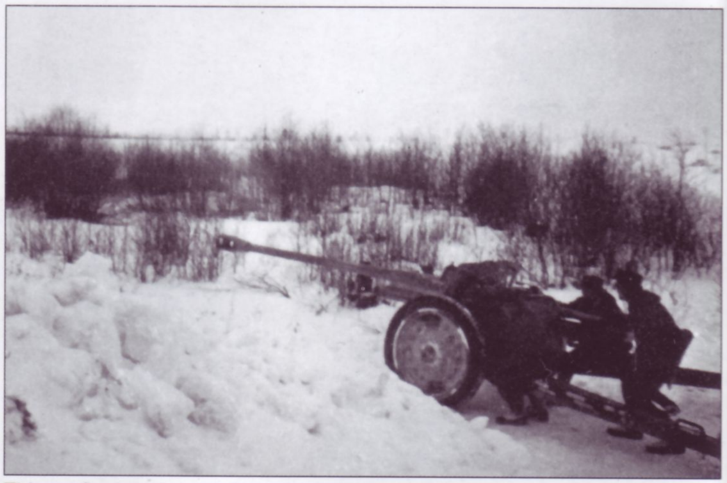
Beginning with the 1939 Polish campaign, Germany began to capture numbers of the classic Swedish-designed Bofors 40mm anti-aircraft gun. Here we see Polish guns, designated 40mm armata przeciwlotnicza wz.36, after their capture in 1939. Widely-used by Germany as the 4cm FlaK28 (Bofors), the gun weighed 2,459kg in travel mode and could fire up to 120 rounds-per-minute (cyclic rate), or 60-90rpm (practical rate). The shell weighed .89kg and was fed in to the gun in four-round clips; the effective ceiling (vertical range) was 7,198-meters.



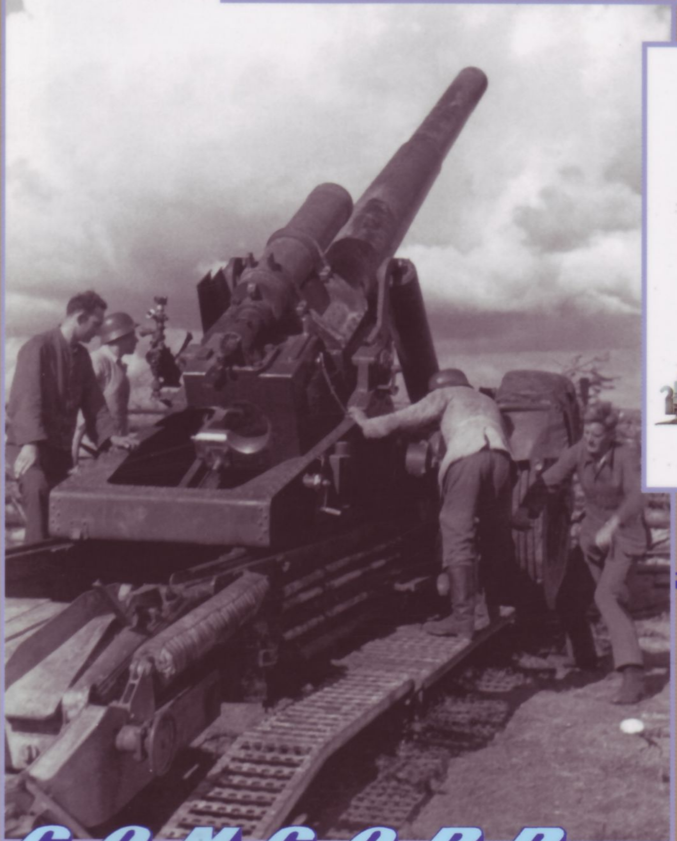
When Germany annexed Czechoslovakia, it inherited the well-designed Škoda-built 47mm kanon P.U.V. vz.36 L/43.4, which was re-designated 4.7cm PaK36(t) in German service. This compact anti-tank gun weighed 570kg, and could penetrate 51mm of armor, angled at 30-degrees, at a range of 700 meters. This performance was almost on par with the German 5cmPaK38 and was superior to the 3.7cm PaK35/36.

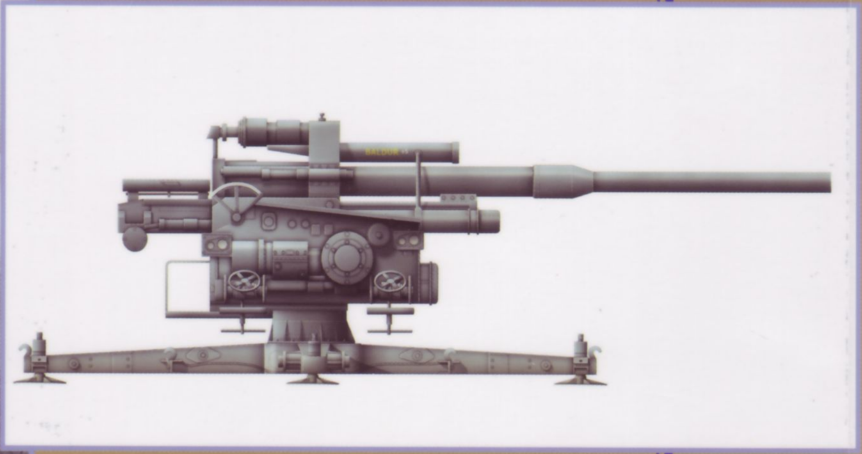


The more modern 85mm Anti-Aircraft Gun Model 1939 began to replace the 76.2mm piece shortly before the commencement of hostilities. A more refined and powerful piece, it weighed 4,220kg in travel order and fired a heavier shell weighing 9.2kg, to a higher ceiling of 10,500-meters. In German service it was designated 8.5cm FlaK M.39(r). Some were re-bored to accept German 8.8cm ammunition and were designated 8.5/8.8cm FlaK M.39(r). Note that this gun is missing its slotted muzzle brake.



This ex-Soviet 76.2mm Field Gun Model 1936 (76-36) is preparing to fire on an enemy target. This photo shows one major disadvantage of a field gun that was pressed into service for anti-tank work: the person who sited the piece, did not actually fire it! Note the lanyard in the hands of the crewman at far right; in addition, the elevation and traversing hand-wheels were on opposite sides of the gun tube, requiring extremely good crew coordination to track a laterally-moving target, such as a tank. In German service it was designated 7.62cm FK 296(r). When fitted with a muzzle brake and re-bored to accept German PaK40 ammunition (as seen here) it was designated 7.62cm PaK36(r). This gun weighed 1,350kg and fired a shell weighing 6.4kg out to a range of range 13,580-meters.





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